# JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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## EDITORIAL NOTES—GAS, &c.

### The Gaslight and Coke Company and their Affairs—Another Excellent Account.

IF it were not for the condition of the coal market, the Governor of the Gaslight and Coke Company (Mr. Corbet Woodall) and his colleagues would, so far as the affairs of the undertaking are concerned, meet the proprietors on Friday under a cloudless sky, and with every cause for mutual congratulation. The policy of the Board during recent times may be summed up in the one word Reformation; and reformation there has been in manufacturing work, in trading, and in finance. The results are plainly presented to anyone who cares to look for them in the accounts of the past half year. There is no fear of the assertions being questioned that this is the Company's record account, and that had it not been for the shrewd work of recent times, the Company would have been in a parlous condition for meeting the current twelve months' increase of a quarter of a million in the cost of raw materials. As it is, the Company stand well, in respect of finance and immediate business and general working. The carry-forward into the current half year, after paying the fixed and other charges and dividend, is £96,511 more than a year ago; there will now be revenue from meter-rents at the rate of about £60,000 a year; the sale of gas in the half year has increased by 3¼ per cent., or 352,029,000 cubic feet (this being upon an increase of 3·94 per cent. in the corresponding half of last year); the number of consumers has been augmented by 12,678, and of stoves by 14,203; better prices have been obtained for coke, and, while high prices for coal are maintained, it may be expected that coke will continue to assist in recouping some of the expenditure under this head. Lastly, the further improvement in the working of the manufacturing department is a point of salient importance in the stability of the concern.

Consider these figures. The increase in the quantity of coal carbonized in the half year was only 9023 tons compared with the first half of 1906, and of spirit used 6029 gallons. But, on the other hand, there was a decrease of 120,378 gallons of oil. Bearing in mind these figures, it must be acknowledged, as a notable fact, that the increase in the amount of gas produced was no less than 429,523,000 cubic feet. Then that there were 11,409,000 cubic feet less carburetted water gas made indicates that the improvement was concentrated in the coal gas manufacture; and as the increase in the quantity of coal carbonized is, in its smallness, out of all proportion with the increased amount of gas made, the improvement, it must be recognized, has run through the entire carbonizing operations.

On financial matters, the mere mention that the balance on the half-year's working—after providing for all fixed charges, setting aside £10,000 for the half year towards the redemption fund, and contributing £11,708 to the insurance fund—is £411,206 (an increase of £47,556), that the sum available for distribution is £641,159 (an increase of £96,210), and that the carry-forward is £306,992 (or £96,511 more than a year ago), very inadequately present the real improvement in the financial strength of the Company. The half-year's revenue not only provided £77,000 more than is required for the fixed and other charges and dividend, but it has had to bear some additional heavy burdens, over certain of which the Directors had no manner of control, while others were created in pursuance of the more salutary financial policy. With regard to the former, in small part through the augmented consumption of coal, and in larger part through its higher price, the increase in the cost of coal was £55,831; of oil, £2003; and of coke and breeze used in the manufacture of carburetted water gas, £6459. With respect to the heavier charges attributable to the more salutary financial policy, it is in connection with the distribution department that these are found. At the last meeting of the proprietors, the Governor made an explanation as to the liquidation of an item that has appeared in the balance-sheet for some twelve years—viz., "Automatic meter supplies (fittings account)"—and he announced how the disappearance of this item would give the Board greater liberty in the matter of providing for depreciation on such perishable appliances as meters, stoves, &c. Of this liberty advantage has been taken in the past half-year's accounts. For repair and renewal of meters, an additional £17,541 has been charged in the revenue account, and for repair and renewal of stoves, £14,336; and an entirely new item appears—viz., "Gas-fittings, including labour, automatic meter supplies, £29,258." If we turn to the capital account, a fresh item is also found there, "Depreciation of meters and stoves, £27,589." This, added to the entry for depreciation of plant (£25,855), makes the writings-off on capital account only short by £872 of the capital expenditure in the half year. The capital account is going to benefit in the future from this change; and we are confident it will meet with the approval of all proprietors who look to sound finance as the greatest security they can have for their holdings.

Other items in the revenue account do not claim much attention. In contrast with the first half of last year, purification is again down; the saving in the half year being £12,778. Rents, rates, and taxes have, contrary to the rule of many years, dropped by £7606; but the payment is still the goodly one of £142,373. The income from gas was close on £40,000 more; and in the rearrangement of the accounts, a new entry, "Rental of fittings, £58,545," appears among the items of revenue. Residuals produced £53,089 more; but as coke returned close on an additional £60,000, it follows that the other products receded somewhat in their yield of income.

The account is an excellent one; and the consumers may rejoice with the proprietors that it enables the Board to save them, despite the great rise in the price of coal, from anything worse than the infliction in the coming twelve months, of an extra payment of ¾d. per 1000 cubic feet by the reimposition of meter-rents. The accounts confirm the opinion previously expressed in these columns, that a better time for re-establishing uniformity in this respect in the Metropolis could not have been chosen by the Board.

### International Photometric Congress—A Hint to Electricians.

THE second session of the International Photometric Committee, which took place, as reported in the "JOURNAL" last week, at Zürich on the 18th to the 20th inst., was more fruitful of good results than a mere perusal of the Committee's resolutions would indicate. Something approaching finality has been reached in the determination of the precise ratios subsisting between the English, French, and German standards of light; and it is now established, by indirect methods of comparison, that the Harcourt standard has, within the limits of observation, exactly eleven times the value of the Hefner. This is a convenient ratio; and we hope that the ease of conversion will induce English electricians to return the illuminating power of electric lamps which have been tested by comparison with the Hefner lamp in terms of the English standard candle, instead of the delusive so-called Hefner "candle." Let them record in their note-books (better still in their memory) the fact that the Harcourt standard is equivalent to 10 English standard candles or to 11 Hefner units, and that consequently values returned in Hefners should be divided by 1·1 in order to obtain the equivalent in standard candles. The illuminating value of gas, or of gas-burners, is never returned in England in Hefners; and we hope electricians who have hitherto had a liking for the German unit, to which the term "candle" is

frequently misapplied, will now give it up in favour of the true standard candle.

It will be remembered that the Institution of Gas Engineers, at its Dublin meeting, passed a resolution to the effect that "This meeting is of opinion that the 10-candle "pentane lamp and the No. 2 'Metropolitan' argand "burner should be the recognized photometrical standards "for gas up to, and including, 20 candles." The main purpose of the resolution was to equip the Institution's delegates to the International Photometric Congress with some definite authority to support these standards in the name of the Institution. Of the two delegates, Mr. Charles Carpenter was unfortunately unable to attend the Congress; and it fell to his colleague, Mr. James W. Helps, to uphold unaided the British position in the photometry of gas. We say unaided advisedly, for except for the unexpressed sympathy of the Dutch and Italian delegates, and the aloofness of the academical representatives, he had to face general hostility on the question. In view of the fact that the Harcourt standard is not yet ten years old, while the Carcel and Hefner are very much older, we think he was wise in not pressing on this occasion for a resolution of the Congress in favour of its universal adoption. If we mistake not, time will settle the matter; and, in a few years, the Congress will acknowledge, without pressing, the general superiority of the Harcourt standard over the inexact Carcel and the inconvenient Hefner. With the No. 2 "Metropolitan" argand burner, Mr. Helps's difficulty was even greater; for we fancy only one of the foreign delegates had seen the burner before Mr. Helps showed it in use at the Congress. He made it clear, however, that English gas engineers intended to accept this, and no other, as the standard gas-testing burner; and we must rest content for the present with the knowledge that considerable interest was displayed in it by the several representatives of the Continental gas engineering societies on the Committee, and some of them at least intend to try it. That conviction as to its merits will follow trial, we do not doubt.

Curiously enough, an attempt was made to pass, at the instance of some of the French delegates, one or two resolutions to the effect that the calorific power of gas might be correctly taken as a measure of its illuminating value in either self-luminous flames or incandescent burners. If the resolutions had referred only to coal gas, they would perhaps have been passed. But one of the objects of the thesis which M. St. Claire Deville presented to the meeting was to demonstrate the correctness of his theory that the calorific power of any illuminating gas—whether coal gas, water gas, or a mixture—is a true expression of its illuminating value in incandescent burners. Herr Strache was able, through his intimate knowledge of the behaviour of water gas, to controvert this theory; and Mr. Helps, and the German, Dutch, and Italian gas engineers, also refused to accept it without some further proof. The resolutions therefore were dropped, and instead there was passed the non-committal resolution quoted last week (*ante* p. 224) to the effect that experimental researches on the relation of the maximum illuminating power of gas to its calorific power should be conducted in the different countries. It would have been disastrous had the Congress committed itself to the support of an unsubstantiated proposition. Certainly, the suggested researches should prove instructive; and the results may even have important practical bearings on the gas manufacture of the future.

Finally, it is necessary to say a few words on the conduct of the business of the Congress. Such international meetings are always difficult to manage successfully, and pending the time when the English, Russian, and Spanish languages shall have fulfilled their destinies, and the more ephemeral European tongues shall have disappeared as means of practical intercourse, or pending the adoption of "Volapuk," "Esperanto," or some other like "universal" language, difficulty and loss of time must unavoidably ensue from the necessity of the interpretation of what is said in one language into at least two others. Thanks to the generous assistance given by several members of the staff of the Zürich Polytechnic, able interpreters were not lacking on this occasion. Nevertheless, more time was wasted than should have been the case; and the business went through in a disordered and desultory fashion. The Congress requires, in the first place, a Chairman having the ability to arrange the *agenda* of the meeting in proper sequence, and to dispose of the *agenda* and control discussion in a businesslike manner. In the second place, the Chairman should, if possible, have a good acquaintance with the English, French, and German languages, so that he may know at once the purport of any speaker's remarks. In the event of their being irrelevant or superfluous, he would then be in a position to check them forthwith, instead of having to wait till their conclusion to learn their import from the interpreter. Unfortunately, M. Vautier, who presided over the Committee both at its first and its second session, though possessed of many good and amiable characteristics, has neither of the two qualifications which we have named as essential in the Chairman of such an International Congress. The International Committee must certainly choose another Chairman for its third session three years hence, if it does not wish to lose the adherence of the gas engineers, who, the world over, have a more wholesome hatred of irrelevance and waste of time than their academical colleagues. It is not easy to say on whom the choice should fall. From the national standpoint, we speak disinterestedly, for no one of the English members of the Committee has, we believe, the necessary linguistic attainments. The selection of Heer van Rossum du Chattel, if he should be able to attend the next session, would probably be generally acceptable, and should prove quite satisfactory. Other possible selections, if only national jealousies may be ignored, are either M. Lauriol or Professor Bunte. It is desirable that the Chairman should not have too strong a personal interest in any of the subjects which will come under discussion. It may seem premature to refer to this matter now, in view of the fact that the Committee will not meet again until 1910; but it is well to put on record the necessity for a change while the members of the Committee still have a vivid impression of the inconveniences under which their second session was conducted.

Zürich is always a hospitable, interested, and interesting city, and probably nowhere else would such generous and useful aid have been accorded to the Committee. Both the municipal and the Polytechnic authorities deserve hearty thanks for their support and assistance. The Committee acted wisely in deciding to go again to Zürich for its third session. Needless to say, we include Herr Weiss, the Engineer of the Zürich Gas-Works, among the local authorities to whom the Committee are greatly indebted for assistance. At the banquet given to the Committee by the Zürich Corporation, Mr. J. W. Helps took the opportunity to congratulate the city on the possession of an ideal gas-works, in charge of an Engineer of unsurpassed ability—a sentiment which will be cordially endorsed by all who know the Zürich Gas-Works and Herr Weiss.

## Points from the North British Meeting.

THERE are very hopeful indications that the meeting of the North British Association of Gas Managers last week, under the presidency of Mr. Lawrence Hislop, will, in the history of the organization, be looked back upon as the turning-point to larger activities. The Association has a history of which the members are legitimately proud; but of recent years there has not been the whole-hearted enthusiasm in the more serious affairs of the Association that its best friends could wish and have wished. To burke the matter, or to rest reposefully in the hope that matters would mend, is not the best way to deal with the trouble of indifference. Mr. Hislop, youngest in the line of Presidents, did not shirk what he conceived, and rightly conceived, to be a responsibility imposed by his position. In one piquant, emphatic sentence, the President, in his address, summed up the position. "If "it were not," he remarked, "for the strenuous efforts of the "few who still take a prominent part in its affairs, the Asso-"ciation would be defunct in a very short time." That is not as things should be; and we cannot but admire the courage of Mr. Hislop in so pointedly discharging what must have been for him a very distasteful duty, but a duty not to be shirked. The justification for his animadversions and for his appeal for the renunciation of indifference and the regeneration of activity was spread before the members in a manner that admitted of no dispute. The responsibility in this matter is an individual one; and it is the sincere hope that the utterances of the President will awaken a response which will declare itself not only in words but in deeds in the near future.

Opportunity is not lacking. To the ordinary technical and administrative work, the junction was effected at this meeting with new roads to activity. A Commercial Section has been established on the lines of those similar sections which are doing such beneficial work in connection with

southward Associations; and what is of immense importance, the affiliation of the territorial Associations of the United Kingdom with the Institution of Gas Engineers has, also on this occasion, been rounded off by the members of the North British Association sinking hollow reasons, and allowing wise counsels to prevail—a resolution being passed which unites the members, as an organization, to, and gives them representation in, all effort emanating from the central body that has for its purpose common industrial and professional benefit. The aloofness of Scotland has been the one breach in unity; and the action of last week will afford universal satisfaction throughout the British gas profession. This we do predict, that now that, by their own volition, they have drawn tighter the bonds with the Institution, it will be found that the fear of blemished dignity has been nothing more than a mirage, which those who feared will be the first to ridicule. In the person of Mr. W. Doig Gibb, the Institution has this year a worthy and eloquent son of Scotland for its President; and the affiliation resolution of the North British Association has therefore a peculiar fitness.

The technical matters that were introduced to the members at the meeting were practical in character and extensive in subject, from the President's address to the last of the three papers read. If we regard the subject-matter from the beginning of gas-works operations, we stumble over this statement in the President's address: "It is a matter for "surprise that, considering the improvements which have "been effected in nearly every other portion of a gas-works "plant, the methods of carbonization have remained the "same as were in use fifty years ago." It would be a matter for great regret if all that has been done in the application of science to carbonization in gas-works had left the system where it was half-a-century ago; and we should not like the statement to go abroad as authoritative or unchallenged. It is our opinion, however, that the statement is not a rooted belief of the President, but that it was penned without due consideration; for in the very next paragraph of his address we find him saying that "if as much attention "were given to getting the best value possible for our re-"siduals as is given to getting a large yield of gas per ton of "coal, considerable benefit would be derived therefrom." It is remembered, too, that the name of Hislop has not been unidentified with improvement in carbonization methods within the last half century. Whether or not, however, the President is convinced as to the past permanency of the system of carbonization, he does concede, in the latter quotation, that, if there has not been improvement, it has not been for the want of trying to effect it; but it is difficult to understand how the larger yields of gas per ton have accrued with the lamented want of improvement. If we for the moment turn to the useful paper of Mr. Alexander Yuill on "The Practical Management of Gas-Works," we find him in harmony with ourselves, and in discord with the President, on this point; for in a very few lines he tells the history of the improvement in carbonization methods, and the economies that have been produced between the time of the old direct-fired settings and the present regenerative setting with its greater number of retorts, up to twelve. The application of the regenerative system of heating to gas-retorts only dates from the early eighties; and from then, too, dates the accretion in production and fuel economy. Therefore, Mr. Hislop must, on this head at any rate, on further consideration, revise his opinion.

Reverting to the advice that is embodied in the President's remark that "if as much attention were given to get-"ting the best value possible for our residuals as is given "to getting a large yield of gas per ton of coal, consider-"able benefit would be derived therefrom," it is to be hoped that no gas manager is so lax in his management as not to get the "best value" possible for his residuals. But if the President means (we do not think he does) that more attention must be devoted to residuals to the detriment of gas yields, then it must not be forgotten by him that gas is, and must always continue to be, the prime commodity of the gas industry, and therefore to its production first consideration must be accorded. Of this, there is proof sufficient to hand. We cannot, as gas manufacturers, ignore the lessons in kindred industries. In the Mond system of manufacture, great attention is paid to the recovery of ammonia; result, a poor gas and a poor coke. In the bye-product coke-oven system, coke is the staple product; result, a poor quantitative production of gas of the quality required for ordinary gas supply. If, however, the President's advice is intended to go no further than obtaining the "best value" possible for residuals while not neglecting to realize the largest yield of gas per ton, then we are decidedly with him.

Allied to this subject of carbonization is the portion of Mr. Yuill's communication treating of the utility of a carburetted water-gas plant. The term "utility" covers the *soi-disant* "collateral advantages" of such a plant; and those collateral advantages have proved so definite in practice that there is no disputing them. But such advantages are not everything in a commercial industry, where the profit and loss of the manufacturing methods must be the primary consideration. We find in several gas-works the collateral advantages take a very back seat when the coke market is good, and when the price of oil is high, and coal gas can be made at a cheaper rate. With these considerations in mind, the table of costs incorporated in Mr. Yuill's paper should be studied. For the year ending April 30, 1904, he shows a net cost for coal gas only (on a make of 607,900,000 cubic feet) of 12·55d. per 1000 cubic feet; for the year ending April 30, 1906, when 62,341,000 cubic feet of carburetted water gas and 653,610,800 cubic feet of coal gas were made, the net cost for the mixed gas was 10·25d. But the net cost of coal gas that year was 10·03d. per 1000 cubic feet, and of carburetted water gas 12·84d. Where the advantage of the carburetted water gas for that year from the financial standpoint comes in, we are at a loss to understand. The author tells us that, in making comparison, allowance must be made for the higher illuminating value of the carburetted water gas. He does not, however, inform us what were the relative illuminating powers of the coal gas in 1903-4 and 1905-6, and of the carburetted water gas in the latter year; nor does he give any information to show how far the higher illuminating value must be discounted by the lower calorific power. Again, it is not plain from the paper whether Mr. Yuill attributes the lessened cost for repairs on retorts and the saving in carbonizing wages to the assistance afforded by the carburetted water-gas plant; nor is it clear whether the larger total quantity of coal gas made in 1905-6 compared with 1903-4, an increased production per ton of coal carbonized, and changes in the conditions of the coal-gas plant and methods of working, had not something to do with the reduction of the items in comparison with 1903-4. One must have regard to all the circumstances, so as not to do an injustice to the old in endeavouring to make out a good case for the new. Another point that is not made quite plain is as to whether the wages of all the attendants on the carburetted water-gas plant are included in the item "wages, boilers and machinery, 0·96d." Looking at the figures for 1905-6, they seem to form a good argument for the whole of the 715,951,800 cubic feet of gas made that year being produced by the coal-gas plant, and so saving the difference between the coal gas and the water gas of 2·81d. per 1000 cubic feet. It might also have been found that some of the coal-gas items might have been further reduced per 1000 cubic feet by the larger make of coal gas. With his knowledge of Dundee working that we cannot possibly possess, Mr. Yuill can add to the interest attaching to his paper by clearing away the doubt to which the figures may give rise. It is not submitted, however, through the suggestions here, that, in other times and under different market and other conditions, the carburetted water-gas plant would not produce for itself a different financial tale. But the whole story is certainly not told by comparing 1905-6 with 1903-4.

Our friends across the Border are also taking a closer interest in the enemy of the gas manager in other parts of the kingdom—naphthalene—than was their wont formerly. A coal of less richness than cannel and producing gases of greater poverty in solvent properties, has been forced, by a natural order of things, upon the gas makers in Scotland; and the result is that naphthalene is among them, and giving them a taste of its disordering proclivities. Hence it is the subject finds place in the President's address, in Mr. Yuill's paper, and in a contribution by Mr. J. D. Smith, of Stirling, specially treating of one method of preventing naphthalene difficulties. On the general question, there seems a prospect of relief, without adventitious aid, in the vertical retort, or in full charges as under Mr. G. R. Love's plan. But with the orthodox system of carbonization, as we recently remarked, the problem has not yet been solved as to how to avoid in all cases the formation of naphthalene and yet get good carbonizing returns. Therefore, Scotland, like England, has to have recourse to some auxiliary means for dealing with the difficulty beyond the retort-house. The President advises proper attention to the condensing plant; Mr. Yuill, absorption by a suitable oil; and Mr. Smith recounts a satis-

factory result from the use of the Everitt tar-extractor. His experiences are particularly interesting, more especially the one where he found, after the separation of the heavy tar from the lighter oils in the gas, he could, by bye-passing the condensers, accelerate the clearance of deposited naphthalene on the works. The use of retort-house governors came in for prominence at the meeting; and the same benefits that have been secured by their use in England have been realized in Scotland.

The paper by Mr. James Campbell was not of a technical character; but it was instructive, and showed great personal energy, rewarded by success, in breaking new ground in gas supply at Polmont.

## Sequel to the South Metropolitan Rating Appeals.

JUDGING from the array of Counsel before Justices Bray and Lawrence, in the King's Bench Division last Friday, on a motion against a rule calling on the Justices of the County of London to show cause why a writ of *certiorari* should not issue to remove a judgment of the Court of Quarter Sessions into the High Court on an appeal by the South Metropolitan Gas Company against their assessment in various districts, the Justices and the Assessment Committees concerned had taken serious fright over the action of the Company to get set aside a judgment fraught with grave consequences to the gas industry, and particularly to the Metropolitan Gas Companies, in the matter of rating. It will be remembered that the ground upon which the rule was obtained was that Mr. Willoughby, one of the Justices forming the Court, was alleged to be disqualified through (as Chairman of a London Assessment Committee) interest and possibly bias. By "interest," it is not, of course, intended to convey personal pecuniary interest. The arguments on both sides were reasonably submitted to the Court on Friday; but we do not feel—having in view the judgment of the Court of Quarter Sessions, and the common interest that those exercising the functions of assessment authorities have in obtaining judicial decisions converting views and contentions into principles that might possibly thenceforth govern and maintain high assessments—that the question of interest was adequately dealt with. If members of Assessment Committees were altogether disinterested, there would be fewer appeals against their decisions, and fewer reductions on appeal. Justice Lawrence on Friday said that "the law required that every "tribunal should be without interest in the matters in dispute. "This was an invariable principle that should be maintained "at high-water mark." Though the Court has declared Mr. Willoughby to be a person without interest in the assessments of the South Metropolitan Gas Company, and has discharged the rule, everyone has a right to exercise his own opinion—after reading all the arguments addressed to the Court, and remembering the tenor of the judgment of the Court of Quarter Sessions—as to whether the "invariable "principle" has or has not been varied on this occasion.

## The Dublin Gas-Testing Case.

In the "JOURNAL" last week (p. 219), we made some comments on the judgment of Mr. Swifte, K.C., the Magistrate who tried the case of the *Dublin Corporation v. Alliance and Dublin Consumers' Gas Company*. We have since learnt that the matter is still *sub judice*, as an appeal against his Worship's decision has been lodged by the Corporation, and is now pending.

## Some Practical Hints on Carbonization.

It is some time ago, we believe, since Mr. Corbet Woodall used the phrase about methods of carbonizing being in a state of "fluidity." Certain it is that to-day there are considerable doubt and questioning as to the best means to be adopted for the extraction of gas from coal. In nearly every gas-making country—but principally in England, France, Germany, and the United States—the minds of gas engineers, individually and collectively, are directed to retort-house operations and systems of carbonization. Search the recent transactions of any Gas Association, and it will invariably be found that many have been the papers dealing with various phases of the subject of the distillation of coal. Not so long since, the superiority of inclined as against horizontal retorts used to be a favourite topic for discussion. This still remained in an undecided state, when the newer types of stoking machines added yet another item for consideration. Hardly had these improved machines been introduced, when forms of vertical retorts came prominently into notice, and they remain so still. Connected with these additions to the carbonizing engineer's appliances arose questions as to the advantages of long and heavy or short and light charges of coal. Again following on this was the suggestion of altering the shape and the angle of inclined retorts, and the proposal to charge them all but fully with coal; and yet again, naturally enough, the adoption for gas making of similar practices to those in vogue for coke-ovens was brought forward. Horizontal, inclined, or vertical retorts? Small, continuous, heavy, or intermittent charges? These are still points to which a note of interrogation must be put. But for some time to come the engineer will have to give careful attention to his retort-house plant, on whatever system it may be, so as to see that it is managed in the best possible way, and to be sure he is extracting the highest results that can be obtained from it. It is in this connection that we draw our readers' attention to a French engineer's views on the management of gas-works' regenerative furnaces, whose instructions—or the first portion of them—we give in another part of our present issue. M. Derval's hints are intended to be of an eminently practical character, and to serve the purpose of those who have the actual management and working of retort-furnaces in their hands, and who may not be versed in the deeper and more theoretical aspects of gaseous firing. To them we particularly commend the "instructions" given; for we believe they will be found of interest and of service.

## Ratepayers and Gas-Works Purchase.

Seaford is the latest place where the ratepayers have failed to find any attraction in a proposal put forward by the local governing authority for the purchase of the undertaking by which they are supplied with gas—or, at any rate, have not seen sufficient prospective advantage to persuade them to countenance such a scheme. No doubt, the decision was greatly influenced by purely local considerations; and in this connection, it seems that Seaford has suffered the infliction of a "special" water-rate, which has been responsible for a certain amount of shyness at the suggestion of fresh adventure. However, there must always be some particular circumstances applying to individual cases; and it must be confessed that in the present instance everything appears to have been carefully gone into. The Council had adopted the report of a Sub-Committee, in which the opinion was expressed that the gas undertaking in the hands of the ratepayers would largely increase and ultimately become a valuable asset; and that no more advantageous time than the present to purchase would ever occur. The acquisition of the concern at the earliest possible moment was therefore advocated, for which purpose it was suggested that a Bill should be promoted in the next session of Parliament. It was explained that the Company had withdrawn their application for a Provisional Order, which was opposed by the Council mainly on the ground of excessive capital, on which they asked to be allowed to pay 10 per cent. before the consumers could hope for any advantage by way of reduction of price or otherwise; and it was added that the Company had inserted a clause in the Draft Order enabling the Council to buy, "which showed that they were not unwilling sellers." But at the public meeting at which the scheme was rejected—a report of which appears in our news columns—the Chairman of the Company placed this clause in a somewhat different light; for he said it was inserted in the draft merely as the price of the Council's withdrawal of their opposition to the Order, so that it did not in any way constitute the Company "willing sellers." The proposal was thoroughly discussed at the meeting; and it evidently did not commend itself to the great majority of those present—for there were very few votes recorded in its favour. Thus has ended, for the present at least, the Gas-Works Purchase Question at Seaford.

## A Small Beginning.

It is a truism that many big things have small beginnings; but the saying can have had few—if any—better illustrations than in the case of the accounts which have come to hand regarding a gas-workers' strike at Limerick. For several days lately, the city was put the maximum of inconvenience in consequence of a dispute at the gas-works (which led to a general strike) over a ladder! If the newspaper reports are accurate—

and they are certainly circumstantial enough to be so—the trouble originated through two of the men acting up to, and even beyond, the best of Trade Union traditions; for, being joiners, they refused to shift a ladder when requested to do so—the ground of their objection being that this was a labourer's work. After this, of course, the trouble grew at such a rate as to put a rolling snowball altogether out of countenance; a great point being made of the fact that the Manager, Mr. Henry Hawkins (who, by the way, as is generally known, is an Englishman), had stigmatized a statement made by one of the men as "a lie." The strike being in full swing, the men proceeded, in the regulation manner, to formulate demands. The one which called for the "discharge of the Saxon" was not exactly characterized by modesty; but it was about on a level with the request that the men should be paid for the time during which they had been idle, and the business of the city had been disorganized. For several nights the streets (with the exception of the few provided with electric lamps) were unlighted; and many of the manufacturers were threatened with a total stoppage of work owing to the failure of the gas supply. Fortunately, however, at length the men saw things in a reasonable light, and returned to work—apparently with both "demands" unsatisfied. In this way the poorer classes of the community have been spared the great amount of needless suffering which would have resulted from the shutting down of the various factories.

### Municipal Management at Barry.

Readers of the "JOURNAL" who have followed the references that have appeared during the last few weeks to the Barry Urban District Council gas and water undertakings, will probably not be surprised to learn from the report which will be found in another column of this issue, that public feeling in the town has been considerably stirred by the managerial changes on which the Gas and Water Committee have seemingly set their heart. Desiring some guidance, the Committee engaged Mr. Robert Porter, of Elland, to inquire and report on the management and general administration of the gas and water undertakings. When his report was received, it was found that Mr. Porter regarded the capital of the gas-works as being somewhat excessive, which had naturally militated against a reduction of the price of gas. He urged that alterations and renewals should for some time be paid for out of revenue, so as to place the concern on a sounder financial basis. He also concluded there was considerable room for improvement in the management of the undertaking, and that the management did not receive the consideration from the Committee that was conducive to successful co-operation. As to the latter point, the comment Mr. Porter made was of a most uncompromising character—that "the strained relationship between the Committee and Manager, the unwarranted interference of the Committee in matters of detail, and the utter neglect to act upon the advice given by the Manager in the matter of administration, are responsible for much of the mismanagement." Finally, he expressed the opinion that the administration of the department would be better carried out by an entirely separate Committee, who would spend the meeting time in discussing with the Manager the broader question of finance and administration, results obtained, and the best methods of developing the undertaking, instead of "drawing up pettifogging rules to govern the conduct of their Manager in the discharge of his duties." In the case of the water-works, Mr. Porter again advocated a separate Committee; remarking that having regard to the future requirements, &c., of the two departments, there would be sufficient employment for a separate Engineer and Committee for each of the undertakings. The reports were considered; but the result was hardly what one might have looked for in the circumstances. Instead of taking steps to form two Committees, as suggested, the Committee decided to recommend the Council to terminate the engagements of two servants who for many years have served the town in the capacity of Gas and Water Engineer respectively, and appoint one man to supervise the two undertakings! The Council fell in with these views, though not unanimously; but the ratepayers appear disinclined to stand by silent while Mr. F. M. Harris and Mr. E. W. Waite have such summary treatment meted out to them. A public meeting has already been held, at which a resolution of protest was passed; and it would be anything but astonishing if the matter were not allowed to rest there.

## INTERNATIONAL PHOTOMETRIC COMMITTEE.

**Second Session at Zurich.**

FROM OUR SPECIAL CORRESPONDENT.

(*Continued from p. 224.*)

THE report of the proceedings of the Committee which was given in last week's "JOURNAL" was tolerably complete so far as the first day of the meeting was concerned. But considerations of time and distance prevented the proceedings on the second and third days (Friday and Saturday, July 19 and 20) being dealt with except very briefly; and last week's report may appropriately be supplemented by further particulars.

Referring again to the comparisons of the Carcel, Harcourt, and Hefner standards, there will be seen on another page of to-day's "JOURNAL" [313] a translation in full of the report of the official French investigations prepared by MM. Perot and Janet. Following this, will be found a translation of the supplementary report by M. Laporte on the subsequent confirmatory investigations undertaken on behalf of the French laboratories. Then follows M. Laporte's summary of the results obtained in all the researches—French, German, English, and American. This summary formed the basis on which the Sub-Committee worked in drawing up the final recommendation as to the ratios to be accepted. As the ratios accepted were given last week with an obvious misprint, we take the opportunity of re-stating them correctly—

| | | |
|---|---|---|
| Carcel . . . . . | = 10·7$_5$ Hefners | Probable error ± 1 per cent. |
| Harcourt . . . . . | = 10·9$_5$ ,, | |
| ,, . . . . . | = 1·02$_0$ Carcel | |

The small figures printed beneath the line are, as already stated, not to be regarded as significant.

Now that all the reports on which these conclusions depend have been published in the "JOURNAL," it may be useful to direct attention to certain points which may in many minds affect the judgment as to whether the International Committee have made a judicious recommendation as to the ratios which should be accepted. So far as we have ascertained, only the French laboratories seem to have taken the trouble to make direct comparisons of the three standards one with the other. The comparisons at the English and German laboratories, and by the American observers, appear to have been all indirect ones made through the intermediary of incandescent electric lamps, as were also other series of comparisons made by the French observers. Now, it is curious that the direct comparisons give a different ratio between the Harcourt and Hefner standards from that given by most of the indirect comparisons and that adopted by the Committee. The direct observations alone make the Harcourt standard equivalent to 1·009 Carcels or 10·72 Hefners. It would be interesting to know whether there was any reason to suspect that the specimens of the standards used for the direct comparisons were abnormal, or, if not, on what grounds the indirect comparisons were preferred.

M. Laporte, commenting generally on the differences between the results of the various observers, remarks that it is difficult to say whether these differences are due to accidental errors of the measurements or to systematic differences between the different specimens of the standards or to different estimates of the atmospheric conditions. This does not seem very satisfactory; and it would have been better if the respective laboratories had carefully checked their standards and photometers one against another, ascertained the personal idiosyncrasies of the observers, and adopted unimpeachable methods of determining the humidity and degree of vitiation of the atmosphere, before they proceeded to multiply indirect observations which possibly are all affected by some common error of procedure. M. Perot was undoubtedly right when he decided to make direct comparisons in order to eliminate any systematic error which the indirect method of comparison may have involved; and many gas engineers will prefer to trust the results so obtained by him and the other French observers. The direct measurements in round figures give a mean value to the Harcourt standard of 10¾ Hefners; while the indirect measurements give a mean of nearly 11 Hefners.

## GASLIGHT AND COKE COMPANY'S REPORT.

THE following is the report on the working of the Company during the six months ending the 30th of June, which, with the accounts [see p. 337], will be submitted to the proprietors on Friday.

The accounts for the past half year show that, after providing for fixed charges, setting aside £10,000 for the half year towards the redemption fund (in accordance with the provisions of the Company's Act of 1903), and contributing to the insurance fund as shown, there remains a balance of £411,206 6s. 6d. The amount brought forward from the previous half year being £229,952 19s. 11d., there is a total sum available for distribution of £641,159 6s. 5d., out of which the Directors recommend a dividend on the ordinary stock at the rate of £4 8s. per cent. per annum, which will absorb £334,016 19s. 7d. The sum to be

carried forward to the credit of the current half year is £306,992 6s. 10d.

The sales of gas for the half year show an increase of 3¼ per cent. over those of the corresponding period of 1906. There has been an addition during the half year of 12,678 consumers, and an increase in the number of gas-stoves sold and let on hire of 14,203.

The satisfactory result of the half-year's working has been contributed to by the increased sale of gas, a better price obtained for coke, and general improvements in working.

The Directors have to report that the contracts for the supply of coal and oil for the next twelve months have been made at prices seriously higher than those of last year, involving an increased expenditure of some £250,000. Of this, however, some portion will be recouped by higher prices obtained for coke.

The Court of Directors has been furnished by the several Engineers of the Manufacturing and Distribution Departments respectively with the usual certificates that all the Company's plant has been maintained in thorough efficiency.

## GAS STOCK AND SHARE MARKET.

**(For Stock and Share List, see p. 346.)**

THE Stock Exchange has had a very poor week again. Business was much restricted, and almost every market was in a depressed condition. Consols set a bad tone. They fell steadily and persistently right through the week. From 84⅛ on Monday, they came down to 83⅝ on Saturday—cheaper than a 3 per cent. for money price. The Railways started badly under weather influences, and were carried down by the tide of dulness. The rest in general were also affected, with the exception of the American Market. The depression made itself felt as early as Monday; and a lowering factor next day was the failure of the Japanese Railway loan. Wednesday was somewhat irregular; not uniformly bad, but the changes for the worse were in the majority. On Thursday, Americans were the only silver fringe to the dark cloud. On Friday, there was persistent selling; and the dulness was very marked. On Saturday, the prevailing tone, if not worse, was no better. In the Money Market there was an abundant supply, on which the demands could make but little impression; and easy rates were had. Discount promised at one time to harden a little, but gave way again before the close. Business in the Gas Market has been only about a moderate average on the whole; but one or two of the less frequently dealt in issues came into the market to help the aggregate. The general tendency was steady—there being absolutely no change made in any of the leading issues, or even those which may be said to come next in rank. In Gaslight and Coke, the ordinary was every day moderately active at figures which ranged from 96⅞ to 95½. A fully proportionate amount of business was done in the secured issues; the maximum changing hands at 89, the preference at from 106½ to 105½, and the debenture at from 83⅛ to 82½. South Metropolitan was rather quiet, with transactions ranging from 122 to 120¼ in the ordinary and from 83 to 82⅝ in the debenture. A little was done in Commercials; the 4 per cent. marking 105½ and 107, the 3½ per cent. 102, and the debenture 81. In the Suburban and Provincial group, Alliance and Dublin new marked 13⅝ and 13 11/16, British 41½, Bromley "A" from 119¼ to 120½, Hastings 3½ per cent. from 96½ to 98, South Suburban 119, ditto debenture 120½ (a fall of 3), Wandsworth debenture 77¾ and 77½, and West Ham 104½. On the local Exchange, South Shields and Tynemouth advanced. Among the Continental Gas Companies, Imperial was quiet at from 173 to 175, Union was done at 112, ditto preference at 136 and 136½, and European fully-paid at 23½. Malta marked 4¼. Among the undertakings of the remoter world, Bombay changed hands at 6⅝ and 6¾, Oriental at 142¼, Buenos Ayres at 11½ and 11 1/16, Primitiva at 6 29/32 and 7, ditto preference at 5 3/16, ditto debenture at from 95 to 95¾, River Plate at 12⅞, ditto debenture at 94 and 94¼, San Paulo at 13⅜, and Ottoman at 6½.

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The recent death is announced of M. Gaston Emmanuel Sautter, a well-known French civil engineer, a member of the Paris Chamber of Commerce, and a Chevalier of the Legion of Honour. Deceased was in his 53rd year.

Some large gas-engines installed at the Edgar Thomson works of the United States Steel Corporation for use with blast-furnace gas have proved so successful that the Company are contemplating an extension in this direction. The Pittsburg Correspondent of "The Times" described in the Engineering Supplement recently some tests which have been conducted to ascertain their efficiency. An interesting feature of these trials was a run of two weeks on the gas as it came from the furnace without the use of the rotary scrubber, and at the end of the run the impurities were removed from the gas passages and valves of the engine. The use of the gas as fuel under the boilers of the blowing-engines has to be supplemented by coal; but it is hoped that, by developing the power in gas-engines, the combustion of the waste gases alone will be sufficient to raise the steam for the blowing-engines. The piping is a formidable feature of such plant, as, owing to the large volume of gas necessary, the mains have to be of great size. Our contemporary thinks everything points to the success of the four-cycle gas-engine for this purpose.

## PERSONAL.

The retirement is announced of Mr. JOHN ALLEN, who for many years filled the position of Secretary of the South-West Suburban Water Company.

Mr. W. BLUNDELL, who a short time ago was appointed Chief Clerk in the Gas Department of the Stockport Corporation, was recently presented by his former colleagues on the Borough Treasurer's staff at Southport with a smoker's cabinet, in testimony of their high regard for him. The heartiest good wishes were expressed for Mr. Blundell's success in his new position.

At the meeting of the Directors of the East Hull Gas Company last Thursday, it was decided that the designation of Mr. JOHN HOLLIDAY should in future be General Manager and Engineer of the Company. In connection with this change, Mr. R. NELSON, the Draughtsman and Chemist, has been appointed Assistant Engineer; and there have been a few re-arrangements of the clerical staff.

The "Birmingham Gazette" last Tuesday contained an appreciative notice, in their series of articles on "Midland Captains of Industry," of Mr. RICHARD CLAYTON, J.P., the Chairman and Managing Director of the Cannon Iron Foundries, Limited, with whose application of "porceliron" in the manufacture of gas-stoves many of our readers are familiar. Mr. Clayton has been actively associated with the Company for nearly thirty years.

## ELECTRIC LIGHTING MEMORANDA.

**An Electric Light Demonstration in the City—Fiction from East Ham—The Osram Lamp Again—Catering for the Working Man—The Profit Surplus and the Hoary Argument—Lightning Causes Further Trouble.**

THE two Electricity Companies supplying in the City have at length prevailed upon the Public Health Department of the Corporation to allow a demonstration of what the latest forms of electric lamps can do in street lighting. The Companies were stung to the quick by the success of high-pressure incandescent gas lighting in the City; and they have been mighty restless over the matter ever since. Certain it is the City of London Company required something poignant to stir them up to a sense of the indignity of taking £26 per lamp for the melancholy exponents of electric lighting that stood for years in the City streets. This Company are now going to give us a study in light and shade along Holborn Viaduct by means of highly and continuously agitated flame arc lamps, in Farringdon Street by enclosed arc lamps, and in Newgate Street by smaller arc lamps—the charges to be at the rate of £17 10s. each, instead of the existing price of £26 per lamp, with a further reduction for the smaller lamps. And about time too! The Charing Cross (West-end and City) Electric Lighting Company are to be permitted to demonstrate in Cannon Street with centrally hung flame arc lamps, at a cost of £17 10s. If the £17 10s. is the price at which the Companies are willing to carry out the lighting in accordance with sample, it will be interesting to learn more about the other conditions. The Companies have long desired to have this demonstration; and now the opportunity has been granted, they will do their best to make use of it. It is a pity for them that they cannot obtain a decent diffusion of the concentrated light of electric arc lamps. In Cannon Street the flame arcs will show their capability unsupported by such a wealth of shop lighting as obtains in Oxford Street. We do not, however, like the idea of the centrally suspended lamps. There is not room for central standards in Cannon Street; and the City lighting authorities must see to it that every precaution is taken against accident with the strung-up lamps. We suppose, too, sliding ladders on wheels will have to be brought into use—blocking up the centre of already congested Cannon Street—for lamp-trimming purposes. It is noticed that workmen are frequently very busy at the top of the flame arc columns by Blackfriars Bridge; and the lamps in Cannon Street will require just as constant attention. However, the great opportunity has been accorded; and "Lo!" (says the Engineer of the City Company) "the day of salvation draweth near." In the City, where the lighting dwindles off after early office hours, the electricity people can do with as much public lighting as they can get hold of. Hence the struggle.

For fiction, please apply to the "Engineer and Manager, Electricity Works, Nelson Street, East Ham." We have a copy of a circular that this official has issued—a circular which is as barefaced in its exaggeration as anything that has yet been seen in attempts to obtain business by an electricity department. Things must be bad, and the sense of fair play and common justice low, when a man can publish such a circular as the one before us. The householder is asked "Which is the cheaper light—This or That?" and fingers point to an "Osram" lamp in splendid order and a Welsbach burner with the mantle also in good condition. "Which is the better light—This or That?" is the inquiry on another page, and fingers point to a "Tantalum" lamp in first-rate condition, and a decrepit Welsbach burner with only half a mantle suspended from the prop and with the glass cracked and dirty. It is about as dilapidated looking a thing in the way of an incandescent gas-burner as can be conceived. The intelligent gas consumer will ask, "Who would expect under such

conditions that the new Tantalum lamp would not give the better light;" and "Who fancies that I should keep a burner in such a condition?" Then the author of this piece of exaggeration states that incandescent gas lights are "dirty and poisonous," involve "fire risks, explosions, and black ceilings," and that mantles are difficult to fix. We ask him to reconsider this statement after testing the genuineness of the information contained in our "Illumination Truths" series of leaflets. This statement is also found in the circular: "When successfully mounted and lit," the incandescent gas-burner "is said to give 70-candle power, and burn 4 cubic feet per hour." There is nothing to complain about there, save in the doubt expressed by the "is said." But then the Electrical Engineer and Manager of East Ham, whose want of veracity over this matter cannot gain for him respect, states that "after three hours' burning!" the illuminating power of the incandescent gas-burner "deteriorates 25 per cent., and then only gives about 50-candle power." One scrap of hopefulness for the East Ham Engineer and Manager is found in the corroboration here that the burner did originally yield 70-candle power. He, however, again produces the decrepit-looking burner, and states that that is "as it usually is after a few hours' burning! After 100 hours, if still in existence, the candle power will depend upon the state of dilapidation the mantle is in; and it may give as much as 16-candle power!!" We ask whether the electrical profession generally and the East Ham Electricity Committee in particular countenance such invention, which amounts to distortion? Experienced incandescent gas light users must smile at the man who thinks such misrepresentation is going to deceive them.

Let us see what the East Ham Engineer and Manager has to say on the question of price to make the Osram lamp appear cheaper than incandescent gas lighting. He says that a pennyworth of West Ham gas at 2s. 9d. per 1000 cubic feet will last 7½ hours, using 4 cubic feet an hour. That is true. But he also declares that a pennyworth of gas consumed over that time, will only give an average illuminating power of 30 candles or less. That is untrue. There is no reason whatever why the illuminating power should not be maintained during that period at approximately the original 70 candles. We challenge the "Engineer and Manager" of the East Ham Electricity Department for the reasons and proof of his printed assertion. Now as to the Osram lamp, the circular states that a pennyworth of electricity (32-candle power), at 3d. per unit, will last over 11 hours. Is this the truth, the whole truth, and nothing but the truth? We again say it is not. As was pointed out in the "Electric Lighting Memoranda" last week, the nominal illuminating power of the Osram lamps is stated in Hefner candles; the actual illuminating power is from 26 to 29 candles by British measurement, and the consumption of electricity per hour about 35 watts. Therefore, one lamp would use a pennyworth of electricity, at 3d. per unit, in 9½ hours. But it is found that the voltage at East Ham is 240; and the Electrical Engineer knows perfectly well that at every point of lighting a consumer must use two "Osram" lamps (which will give him an illuminating power of about 55 British standard candles), and so exhaust at each point a pennyworth of electricity in 4¾ hours as against 7½ hours in the case of an incandescent gas-burner consuming 4 cubic feet of gas an hour, and giving an illuminating power of 70 candles. The "Osram" lamp of the nominal 32 (Hefner) candle power costs 4s. every time it has to be renewed; the two lamps at one point of lighting will cost 8s.; and the 8s. must be multiplied by the number of points of use in a house. Why cannot the East Ham Electricity Engineer tell the whole truth about these matters, instead of waiting to be found out by the consumers?

A humorous article has been published in the "Electrical Times" on "Free Wiring and Slot Meters." The humorist is Mr. G. H. Nisbett, M.Inst.E.E. He says that it does not seem obvious to an outsider why supply engineers, with but few exceptions, have made no attempt to obtain a very "lucrative" class of business which lies ready to their hand—viz., the electric lighting of workmen's houses, and the smaller classes of customer comparable with them, by means of slot meters, and the necessary accompaniment of "free" wiring. Later on, he gives two "possible" reasons for the want of attack in force upon this "lucrative" class of business. The first is that "the capital cost of the electric service so much exceeds that of gas supply, as to make the difference between profit and loss on the business;" and the second is that "the working man cannot afford to pay such a price for electric lighting as would be remunerative to the suppliers." Those are a couple of reasons that are not only possible but have an actuality in experience; and the one is found to react largely on the other. That the working man will not, and cannot afford to, pay heavily for an insufficiency of electric light is the reason why the "free" wiring business has proved a failure in so many places—notably at Woolwich. And when to the ordinary price per unit of electricity is added a sum to recompense for the capital outlay on the electricity prepayment installation, and for the extra work in proportion to custom brought upon the department by the prepayment consumer, electricity as a lighting agent is placed far beyond the reach of the working man. Another reason is that electricity slot meters are not yet so reliable that they commend themselves to engineers generally; though this is saying something that directly contradicts a statement by Mr. Nisbett that "reliable slot meters can be obtained for about £2 each." It is that gentleman's belief that 1½d. per unit above the ordinary rate would cover the extra cost of electricity. Suppose the ordinary price is 4½d., the 1½d. additional would make the charge 6d. Mr. Nisbett reckons on a price of 3½d. + 1½d. per unit; and he thinks that five 8-candle power lamps are quite sufficient for a working-man's house—that is to say, an illuminating power of 40 candles (when the lamps are new and the voltage right) spread through the rooms of the house. What is not good enough in the way of illumination for Mr. Nisbett is not good enough for the working man; and for this insufficient illumination Mr. Nisbett expects him to pay £1 11s. 3d. per annum, which works out at 7¼d. per week, or 1d. per day. Now we make out that this will give the working man six hours' use per day of one 8-candle lamp, or if his five 8-candle lamps are used at the same time—and he and his family will want them if they do not desire to spend a wretched existence—he can keep them running for 1¼ hours per day, and then go to bed. Poor working man, and poor wife and family! We should fancy some working men would be inclined to take rather sharp measures with Mr. Nisbett if he insulted them face to face with his proposition, that what is not good enough for him is good enough for them. Supposing the slot meter price of gas is 3s. 6d. per 1000 cubic feet, the working man can purchase 24 cubic feet of gas for 1d.; and he can keep going with that quantity of gas at least four bijou inverted gas-lights of an average 20-candle power for about five hours, or using one only for about twenty hours. Mr. Nisbett has not experienced the slightest difficulty in working down to the ludicrous to make out a case on paper, and in this he does not stand alone among electricians.

The Edinburgh City Council have had their annual discussion as to what should be done with the surplus balance on last year's trading of the Electric Lighting Department. There is only a matter of about £11,000 to be dealt with; and £1055 has been transferred to the reserve fund. The balance of £9919 was the bone of contention. The Electric Lighting Committee were most anxious to use the sum in reduction of moneys borrowed in the past, but which should have been properly charged to revenue. There was the hoary argument, that something should go in aid of the rates as compensation for the cheap money the security of the rates afforded the undertaking. In opposition to this, the axiom may be accepted that the stronger financially a municipal trading undertaking can be made, the greater the security it offers the ratepayers. We also venture to think that the position of the electricity undertaking in favoured Edinburgh is a sufficient security for all the money the department will need. And for the life of us we cannot see why 9000 electricity consumers should relieve the 60,000 non-electricity consumers of ¾d. in the pound. But a majority of the councillors voted for popularity rather than for the financial betterment of the undertaking.

Not long since we reported that a fire had been caused in a church at Blackburn through the fusing of an electric light wire by lightning. The experience has been repeated at Hereford. During a heavy thunderstorm in the town early last week, a fire was caused at a drapery establishment through lightning fusing an electric light wire. At Wycombe on the Sunday night there was a complete dislocation of the electric light; and wherever that system of lighting had been adopted, the town was in darkness for some hours.

## Illuminating Engineering Society of New York.

The first annual convention of the Illuminating Engineering Society is being held to-day and to-morrow at the Edison Building, Boston, Mass. Owing to the number of papers that have been promised, the amount of business that will be necessary to transact at the convention, and the time necessary for recreation, it has been decided that the convention will be opened at 9.30 sharp this morning. To-morrow afternoon and evening it is planned to take the entire convention to the beach, with a shore dinner, for the members, their guests, and ladies. The following is the programme of papers that have already been promised:—

President's Address, Dr. C. H. Sharp.
Check on Reliability of Photometric Curves, J. S. Codman.
Electric Light as Related to Architecture, C. Howard Walker.
Acetylene, A. Cressy Morrison.
What is Street Lighting? W. H. Blood, Jr.
A New Comparison Photometer, Dr. Charles H. Williams.
Primary, Secondary and Working Standard of Light, Dr. Edward P. Hyde.
The Inverted Gas Light, T. J. Litle.
Lighting of the Boston Edison Building, Dr. Louis Bell, L. B. Marks, and W. D'A. Ryan, Committee.
Illuminating Engineering and Central Station Practice, L. H. Scherck.
New Lights and New Illuminants from the Central Station's Point of View, R. S. Hale.
Co-efficients of Diffuse Reflection, Dr. Louis Bell.
School House Illumination, B. B. Hatch.
Illumination of the Engineering Societies' Building, C. E. Knox.
The Elements of Inefficiency in Diffused Lighting Systems; Illumination Photometers and their Use, Preston S. Millar.
The Present Status of Candle Power Standard for Gas, C. H. Stone.
The Luminous Arc, W. D'A. Ryan.

This list of papers should make a most attractive programme, covering a wide range of topics, and laying before the members the results of a large amount of original research. Still other papers are expected which will further add to the importance of the convention from the technical standpoint.

The late Mr. G. Dunbar Malam, who was for some years Engineer and Manager of the Bingley Gas-Works left £6868.

# THE STORY OF THE GAS SUPPLY OF TOKIO.

**From Information Supplied by Mr. Mizuta.**

WELCOME of the heartiest character was given at the meeting of the Institution of Gas Engineers in Dublin to Mr. M. Mizuta, representing the gas profession of the Far East. He is one of the Engineers of the prosperous and progressive Tokio Gas Company; and on his arrival in this country, he offered to supply to the "JOURNAL" the material for a descriptive article. He has redeemed his promise; and it is with much pleasure that we are able to show, by narrative and photograph, how advanced, in the technical and administrative work of the gas industry, are our friends of Tokio.

**Head Office of the Tokio Gas Company.**

In Japan at the present time, there are only nine gas undertakings, in operation or in process of construction. These comprise the works at Tokio, Osaka, Yokohama, Kobe, Nagoya, Nagasaki, Fukuoka, Moji, and Sendai. Certain of these works are not in operation yet. Nagoya, for example, commences working this December; and the plans for Moji and Sendai are in course of development at the present time.

### THE TOKIO GAS SUPPLY.

Regarding Tokio, the original gas-works, known as the Shiba station, were designed by the then Engineer, M. Pelegelain some 34 years ago; and gas was first supplied to the street-lamps on Dec. 18, 1874—the number of street-lamps at the time being only 85. The works were established by the Municipality; but the price of gas was then such that the undertaking did not flourish. It passed into the possession of the Company in 1885—the number of consumers then being 343; of burners connected, 6678; and of street-lamps 400. The length of mains laid was only 11 miles 62 chains. The demand for gas, however, was very small; being only about 71,000 cubic feet a day. The consideration paid by the Company for the works was 269,000 yen, or (say) £26,900.

### A PROGRESSIVE BUSINESS.

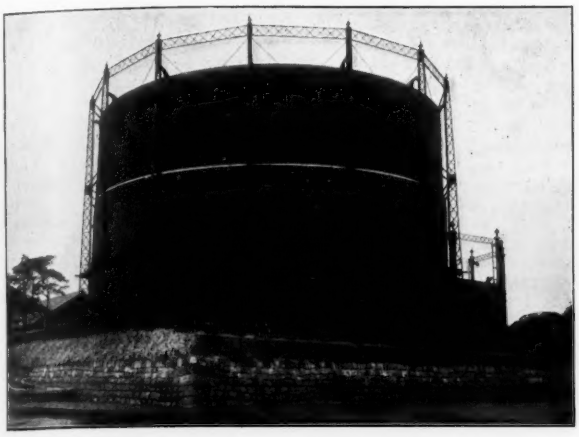
In the 22 years that have elapsed since the transfer to the Company, the business has made substantial headway, under wise and judicious management. The capital is 8,400,000 yen, or equal to about £840,000; and the projected extensions of the works, it is calculated, will about double this capital. Both coal and carburetted water gas are made at the works; the production being in the second half of last year, 359,385,500 cubic feet of coal gas and 26,172,000 cubic feet of carburetted water gas. The increase in the consumption of gas in the half year was 17·2 per cent., compared with the corresponding period of 1905. The quantity of coal carbonized was 30,726 tons; and for the manufacture of water gas, 1,825,679 Japanese lbs. of coke were used (1 Japanese lb. = 1·323 English lbs.), and 86,624 English gallons of oil. The make of gas from 1 lb. of coal was 5·222 cubic feet; and of water gas from a ton of coke 32,110 cubic feet—the oil used for enrichment averaging 3·386 gallons per 1000 feet. Further evidence of the progressive character of the undertaking is furnished by the extent of the distribution system at the end of December last compared with its character when the Company took over the works. As stated above, there were only between 11 and 12 miles of mains laid in 1885; at December last, the length of mains was 166 miles 10 chains, and of services 289 miles 72 chains.

**Modern Gas-Fittings Show-Rooms.**

### THE COAL AND OIL SUPPLY—RESTRICTED USE OF CARBURETTED WATER GAS.

A few words about the raw materials used in gas manufacture. Coal is chiefly obtained from the northern part of Japan—Yubari or New Yubaria being the best coal for the purpose. Many other sorts are also used for gas making; three descriptions, which come from the south, being Shiyogashira, Tagawa, and Miike. The price of coal varied from 12s. to £1 2s. per ton last year. The oil used in the manufacture of water gas is also obtained from the northern district of Japan; the oil having a specific gravity of ·903. The price paid for 1 koku of oil (1 koku = 4·96 bushels) is rather more than 10s. The cost of oil has been advancing of late years, and, in addition, the price of coke is not so low as in England; so that carburetted water gas cannot be made so cheaply as coal gas. Water gas is not used continuously. The Japanese Government has, in fact, restricted its employment to one-third of the output of gas. The illuminating power of the gas distributed is not regulated by the Government; but the

**The Shiba Works—The Inclined Retort-House.**



**The Shiba Works—A Two-Lift Gasholder in Steel Tank.**

Company supply a good illuminating quality—the carburetted water gas being 18-candle power and coal gas 16-candle power.

ADMINISTRATION AND EXECUTIVE OFFICERS.

Before giving a sketch description of the plant in use at the works, Mr. Mizuta supplied the names of the gentlemen engaged in the administration of the Tokio Company's affairs, and of the Executive Officers. We reproduce them—

*Chairman*: Baron SHIBUSAWA.
*Managing-Directors*: The Honourable Professor (Tokio University) T. TAKAMATSU; Mr. R. KUME.
*Directors*: Mr. S. ASANO, Mr. S. OHASHI, Mr. F. WATANABE, Mr. K. HAKAMADA, Mr. K. FUKUSHIMA.
*Auditors*: Mr. S. WATANABE, Mr. T. KOBAYASHI, Mr. K. ITO.
*Chief Engineer*: Mr. S. HIRAMATSU.
*Engineers—Shiba Works*: Mr. A. NAITO.
*Sarue Works*: Mr. T. UEDA.
*Hashiba Works*: Mr. M. MIZUTA.
*Bye-Products Works*: Mr. N. MORI.
*Fitting and Repairing Works*: Mr. R. SASABE.
*Secretary*: Mr. G. HAGIWARA.

UP-TO-DATE EQUIPMENT.

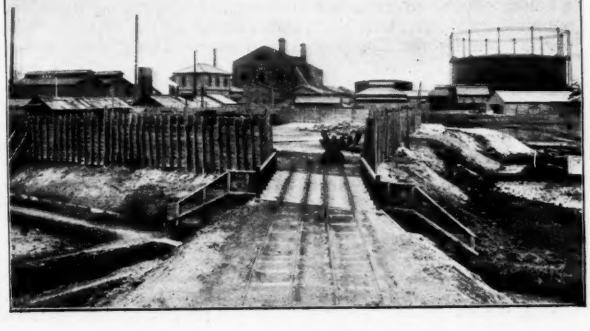
*Shiba Works.*—These works stand on the site of the works erected on the institution of gas supply in Tokio. Formerly they were equipped with small horizontal retorts; but these have given place to inclined retorts. At this station, the number of inclined retorts is 56, 20 feet long by 24 inches by 16 inches; each bed containing seven retorts. The settings are of the same design as those Mr. S. Y. Shoubridge constructed at the Salford Corporation Gas-Works. The equipment embraces coal-breaker, elevator, push-plate conveyor, and continuous hoppers. From the retort-house, the gas travels to water-cooled condensers of tubular form, designed on the works. There is nothing special to note about the exhausting plant, the "Standard" and Livesey washers, and water-sealed purifiers, except that oxide only is used in the latter. At these works there are two holders. The larger is of 660,000

**The Hashiba Works—The Largest Building in Front is the Carburetted Water-Gas Plant House.**
(Rice-Fields in the Foreground.)

cubic feet capacity, with two lifts and steel tank; this form of construction being necessary, as the nature of the ground (which is not so solid as in England) does not permit of brick or concrete tank work. The smaller holder is of 200,000 cubic feet capacity, two-lift, and with cast-iron tank. The station meter is of 40,000 cubic feet per hour capacity; and there are two governors—one 24-inch and the other 12-inch. The trunk mains to the city are 24 inches in diameter; and the gas leaves the works at ordinary pressures—2¼ inches in the day and 3 to 4 inches in the evening.

*Hashiba Works.*—These are the works of which Mr. Mizuta is the Engineer. The increasing demand for gas necessitated that the gas supply should be supplemented. The Hashiba works were the result; and their original construction was finished in November, 1893. The retort-house at that time was small; the equipment only consisting of 8 feet horizontal retorts. Here, too, things underwent a great change. There was no hesitation on the part of the Board and their Chief Engineer to spend to realize improvement in efficiency. Now the equipment comprises 74 horizontal retorts of 8 feet length, and 57 inclined ones of 20 feet length, by 24 in. by 16 in. Of the 57 inclines, 21 are in beds of sevens, the same as at the Shiba works; and the remaining 36 are in beds of nines. The ironwork was supplied by West's Gas Improvement Company, Limited; and the retorts were also sent from England, but the fire-bricks were made in Japan. The work was executed by Japanese handicraftsmen. The coal is put into store alongside the house, and each bench of settings—the three beds of sevens, and the four of nines—has its own coal-breaker, elevator, and hopper. Each hopper has a capacity of 12 tons. The charges are of 5 cwt.; but the duration of carbonization varies from six to seven and eight hours, according to the character of the coal being used. Japanese coal, Mr. Mizuta informs us, is not suitable for four-hour charges; and six or seven hours is a fair time for its carbonization. A water-gas plant is an important part of the equipment of these works. It has a capacity of a million cubic feet, in two sets, and was supplied by the Economical Gas Apparatus Construction Company, Limited. The plant is not always used; its service being required only for a short period in the autumn and winter.

After the coal gas leaves the retort-house, it passes through a Pelouze and Audouin tar-extractor, and then through an annular condenser of the air-cooled type. The Waller exhauster is driven by a gas-engine. There are six sets of tower scrubbers;



**Another View of the Hashiba Works.**

**The Sarue Works—The Steel-Framed and Galvanized Iron Inclined Retort-House.**

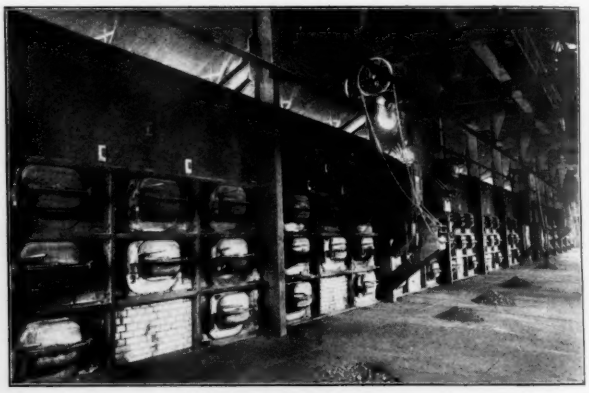
the gas passing through in three directions. Then a "Standard" washer and the purifiers deal with the gas; and, after being metered, it passes to a mixing chamber of special form, where it mixes with the carburetted water gas, when it is being made. The course of the water gas is from the generating plant to a condenser, thence to a scrubber, and onwards to the relief holder. From there to the water-gas purifiers, on to the meter, into the mixing chamber, thence (in admixture with the coal gas) to the gasholders. At this station, there are four gasholders—one of 1 million cubic feet capacity, and another of ½ million capacity. For both of these the material was supplied by the Whessoe Foundry Company; and the erection was carried out by the Company's own staff and workmen. There is also one of 120,000 cubic feet capacity, and one of 80,000 cubic feet. The smallest is the one now used as the water-gas relief holder. The trunk main from these works is of 24 inches diameter. There is a large amount of spare land at the works, set apart for future extensions.

**On the Discharging-Floor of the Sarue Inclined Retort-House.**

*The Sarue Works.*—These works are also modern; and the Company have arranged to make their carbonizing operations here somewhat extensive, seeing that the works are well situated on the river for the reception of the raw material, and the disposal of the secondary products. The works have at present an installation of 96 inclined retorts, the same size as those at the Shiba works, but arranged in two benches, each setting containing eight retorts. The retort-settings were designed by the Engineer, Mr. T. Ueda; the ironwork and retorts being supplied from England. The house in which this installation has been made, consists of a steel-framed structure, covered by galvanized iron. The remaining plant includes a Pelouze and Audouin tar-extractor, an air-cooled annular condenser, steam-driven exhauster tower scrubber, "Standard" washer, and purifiers on Green's luteless system. The first floor of the purifying-house is used for revivification. The gas is metered, and then passes to a holder of 600,000 cubic feet capacity, the material for which was supplied by Messrs. C. & W. Walker, Limited; the erection being carried out by the Company's own men. The ground is now

**The Bye-Products Works at Fukagawa.**

being excavated for a new holder of 1½ million cubic feet capacity the contract for this having been secured by the Whessoe Foundry Company. This holder will be the largest in the Far East. The trunk main is 36 inches in diameter. There is such intercommunication between the three works, that the supply of gas



**The Charging-Floor of the Sarue Inclined Retort-House.**

to all parts of the city can be regulated according to the demand.

*The Bye-Products Works.*—The Company here make sulphate of ammonia; but the plant is only of 2 tons capacity at present. They are, however, going to extend it; there being an excellent

**A View in the Fitting and Repairing Works at Fukagawa.**

demand for sulphate in Japan. The Company also engage in the distillation of coal tar, and produce benzene, solvent naphtha, naphthalene, creosote oil, pitch, light oil, and carbolic acid. All these products are in good request in the country.

### Financial Results.

We may give a few figures here from the accounts of the Company to show their remarkable financial progress.

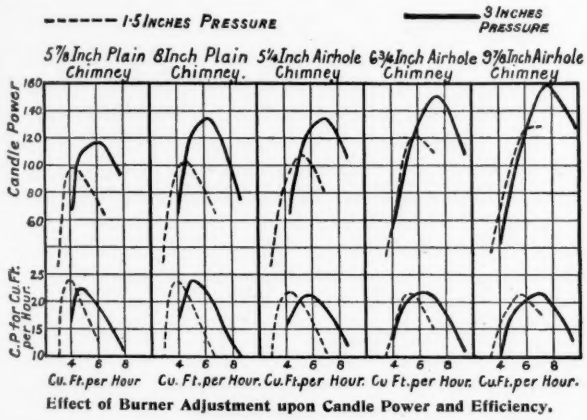
| | | Revenue. | Expenditure. | Gross Profit. | Total Dividend. | Dividend Per Cent. | Amount added to Reserve Fund. | Amount added to Special Purposes Reserve. |
|---|---|---|---|---|---|---|---|---|
| 1906, | First Half | 1,475,470.yen | 988,311.yen | 487,159.yen | 420,000.yen | 15 | 25,000.yen | 21,016.yen 162 |
| 1905, | Second ,, | 1,298,925. ,, | 810,687. ,, | 488,238. ,, | 393,708. ,, | 15 | 25,000. ,, | 33,018. ,, 930 |
| | First ,, | 1,188,622. ,, | 719,210. ,, | 469,412. ,, | 341,208. ,, | 15 | 26,000. ,, | 33,569. ,, 376 |
| 1904, | Second ,, | 998,191. ,, | 614,093. ,, | 384,098. ,, | 294,000. ,, | 14 | 20,000. ,, | 25,428. ,, 080 |
| | First ,, | 955,782. ,, | 584,078. ,, | 371,704. ,, | 289,086. ,, | 14 | 20,000. ,, | 22,069. ,, 285 |
| 1903, | Second ,, | 851,486. ,, | 523,481. ,, | 328,005. ,, | 265,566. ,, | 14 | 17,000. ,, | 15,964. ,, 404 |
| | First ,, | 814,402. ,, | 476,846. ,, | 317,556. ,, | 255,780. ,, | 14 | 16,000. ,, | 15,518. ,, 364 |
| 1902, | Second ,, | 736,630. ,, | 446,221. ,, | 290,409. ,, | 237,636. ,, | 14 | 15,000. ,, | 13,089. ,, 364 |
| | First ,, | 745,116. ,, | 454,933. ,, | 290,183. ,, | 232,554. ,, | 15 | 15,000. ,, | 14,794. ,, 332 |
| 1901, | Second ,, | 662,001. ,, | 427,398. ,, | 234,603. ,, | 225,372. ,, | 16 | 12,000. ,, | 11,931. ,, 983 |
| | First ,, | 648,023. ,, | 422,703. ,, | 225,320. ,, | 215,670. ,, | 17 | 12,000. ,, | 12,000. ,, 000 |
| 1900, | Second ,, | 593,004. ,, | 396,416. ,, | 196,588. ,, | 169,575. ,, | 17 | 10,000. ,, | 15,000. ,, 000 |
| | First ,, | 529,548. ,, | 359,635. ,, | 169,913. ,, | 132,993. ,, | 16 | 10,000. ,, | 14,500. ,, 000 |

# INFLUENCE OF CHIMNEYS UPON INCANDESCENT BURNER EFFICIENCY.

THE variety of glass ware in use with ordinary incandescent gas-burners lends some interest to the investigations recently originated by the "Illuminating Engineer" for the purpose of determining the influence of chimneys upon the efficiency and general lighting results achieved. Our contemporary disclaims any commercial or other interest in the work thus undertaken, save that of its readers and illumination practice generally; but it is not at all unlikely that some of the data obtained and thus supplied will be of considerable service to those engaged in the manufacture of incandescent burner chimneys.

For the purpose in view, five different forms of common clear glass chimneys were purchased in the open market. These consisted of two plain straight chimneys, one measuring $5\frac{7}{8}$ in. long by $1\frac{15}{16}$ in. and the other 8 in. by $1\frac{15}{16}$ in., and three air-hole chimneys, respectively $5\frac{1}{4}$ in. long by $2\frac{1}{4}$ in., $6\frac{3}{4}$ in. by $2\frac{3}{8}$ in., and $9\frac{7}{8}$ in. by $2\frac{7}{8}$ in.—the maximum diameter being given in each case. These were submitted to the New York Electrical Testing Laboratories for photometric testing with a Welsbach gallery burner equipped with deck plate and mantle. The first tests were confined to the measurement of the candle power (horizontal rays) with varying rates of consumption; the gas being taken from the street mains at a pressure of $1\frac{1}{2}$ inches.

The results thus obtained are dealt with by our contemporary in its first article on the subject. As, however, it was acknowledged that higher pressures than $1\frac{1}{2}$ inches might yield different results, it was decided to repeat the tests under other pressure conditions. We propose therefore dealing with the two sets together, and reproduce a diagram which includes the curves of both.




**Effect of Burner Adjustment upon Candle Power and Efficiency.**

The continuous line curves show diagrammatically the candle power and the efficiency (expressed in candle power per cubic foot per hour) of the burner when fitted successively with the five chimneys and consuming gas at various rates under a pressure of 3 inches. The broken-line curves give the results at the $1\frac{1}{2}$ inches pressure already referred to.

The following tables show the maximum candle power and the maximum efficiency obtained with each chimney, and the corresponding gas consumption and duty.

| Chimney. | | Maximum Candle Power. | | Consumption. (Cub. Ft. per Hour.) | | Efficiency. (C.P. per Cub. Ft. per Hour.) | |
|---|---|---|---|---|---|---|---|
| | | 1½ in. P. | 3 in. P. | 1½ in. P. | 3 in. P. | 1½ in. P. | 3 in. P. |
| *Maximum Candle-Power Basis.* | | | | | | | |
| $5\frac{7}{8}$ in. | (a) | 98 | 117 | 4·25 | 6·0 | 23·0 | 19·5 |
| 8 ,, | (a) | 103 | 134 | 4·75 | 6·2 | 21·7 | 22·4 |
| $5\frac{1}{4}$ in. | (b) | 107 | 134 | 5·45 | 7·0 | 19·6 | 19·2 |
| $6\frac{3}{4}$ ,, | (b) | 121 | 150 | 5·95 | 7·5 | 20·3 | 20·0 |
| $9\frac{7}{8}$ ,, | (b) | 128 | 158 | 6·75 | 7·8 | 19·0 | 20·5 |
| *Maximum Efficiency Basis.* | | | | | | | |
| $5\frac{7}{8}$ in. | (a) | 96 | 106 | 4·0 | 4·7 | 24·0 | 22·4 |
| 8 ,, | (a) | 92 | 121 | 3·9 | 5·0 | 23·7 | 24·0 |
| $5\frac{1}{4}$ in. | (b) | 91 | 120 | 4·25 | 5·6 | 21·9 | 21·3 |
| $6\frac{3}{4}$ ,, | (b) | 118 | 135 | 5·5 | 6·2 | 21·5 | 21·7 |
| $9\frac{7}{8}$ ,, | (b) | 117 | 151 | 5·5 | 7·0 | 21·3 | 21·6 |

(a) Straight. (b) Air-hole.

Commenting upon the above, the "Illuminating Engineer" remarks that the tests generally seem to establish the following points: First, that the highest efficiency is given by the short chimney with pressures under $1\frac{1}{2}$ inches, and by the 8-inch plain chimney with pressures from $1\frac{1}{2}$ to 4 inches; second, that the greatest candle power is obtained with the longest air-hole chimney; third, that a burner adjusted to yield its maximum candle power with any given chimney does not work at its highest efficiency, and *vice versâ;* and fourth, that increased pressure increases the candle power with all chimneys, but beyond a certain point decreases the efficiency.

It is obvious that the above data depend upon several factors, such as the burner, mantle, its age, quality of gas, and the like, which may well be termed variables; and the laboratory report is careful to state that their quantitative interpretation must be subject to the limitations imposed by single sets of conditions. The results, however, are so far concordant that they may perhaps be accepted as generally warranting the conclusions of the "Illuminating Engineer." It is useful to note that with the longer plain chimney, and still more with the air-hole chimneys, the greater amount of total light is only obtained with a higher consumption of gas—a fact which seems to suggest that where consumers have found increased light resulting from the adoption of perforated glass chimneys, these have been simply acting as correctives by affording additional air to some excess gas.

Our contemporary draws attention to the indication given by the curves that the highest efficiency of an incandescent gas-burner is not obtained under the conditions at which it gives its maximum quantity of light. The only combination of burner and glass ware where they nearly accord is, however, that of the $5\frac{7}{8}$-inch plain chimney; and experimental error might well account for the fact that they do not. In the other cases, it must be agreed with the "Illuminating Engineer" that the consumer's practice, of adjusting a burner to obtain the maximum light, invariably causes it to operate considerably below its maximum efficiency. Unfortunately, a consumer has no ready means of knowing when he attains the greatest duty from his burner.

A further set of tests, with the same burner and chimneys, was made to ascertain the effect of varied gas pressure with a fixed burner adjustment. The curve diagram shows in each case an increasing total candle power as the pressure is raised up to $4\frac{1}{2}$ inches, but with a progressive rise in the gas consumption. The efficiencies, however, of the several combinations (excepting in the one case of the $9\frac{7}{8}$-inch air-hole chimney) dropped soon after $1\frac{1}{4}$ to 2 inches pressure was passed. The following table gives the salient figures:—

| Chimney. | | Pressure. (Inches Water.) | Maximum Candle Power. | Efficiency. (C.P. per Cub. Ft. per Hour.) | Consumption. Cub. Ft. per Hour. |
|---|---|---|---|---|---|
| *Maximum Candle Power Basis.* | | | | | |
| $5\frac{7}{8}$ in. | (a) | $4\frac{1}{2}$ | 136 | 17·1 | 8·0 |
| 8 ,, | (a) | $4\frac{1}{2}$ | 154 | 20·7 | 7·3 |
| $5\frac{1}{4}$ ,, | (b) | $4\frac{1}{2}$ | 154 | 20·7 | 7·3 |
| $6\frac{3}{4}$ ,, | (b) | 4 | 162 | 18·3 | 8·9 |
| $9\frac{7}{8}$ ,, | (b) | $4\frac{1}{2}$ | 180 | 19·6 | 9·2 |
| *Maximum Efficiency Basis.* | | | | | |
| $5\frac{7}{8}$ in. | (a) | $1\frac{1}{4}$ | 95 | 22·4 | 4·0 |
| 8 ,, | (a) | 2 | 123 | 25·1 | 5·0 |
| $5\frac{1}{4}$ ,, | (b) | $1\frac{1}{2}$ to 2 | 90 to 104 | 21·2 | 4 3 to 4·9 |
| $6\frac{3}{4}$ ,, | (b) | $1\frac{1}{4}$ | 105 | 21·3 | 4·9 |
| $9\frac{7}{8}$ ,, | (b) | 3·2 to 4·2 | 153 to 175 | 19·7 | 7·9 to 8·9 |

(a) Straight. (b) Air-hole.

In speaking of the air-hole chimney, our contemporary had previously remarked that it would probably come as a surprise to many that this, which was accepted from Germany as a great improvement, was, as a matter of fact, inferior in efficiency to the plain, straight chimney. In a later article, the subject is again referred to for the purpose of further inquiry. The tests in this case were made with the view of determining whether the characteristic performance of the burner equipped with the perforated chimney was due to the effect of the air-holes or to the peculiar shape of this class of ware. The two $6\frac{3}{4}$-inch and $9\frac{7}{8}$-inch air-hole chimneys (with, however, the holes closed by mica strips) were chosen for investigation; and at the same time a mica chimney, 7 in. by 2 in., was subjected to test—first plain, then perforated. The gas was taken from the New York City mains under a pressure of $1\frac{1}{2}$ inches, as in the case of the first set of tests. Curves of the results contrasted with previous data are given; and from these the following information is gleaned:—

| Chimney. | Maximum Candle Power. | | | Maximum Efficiency. | |
|---|---|---|---|---|---|
| | Candle Power. | Cubic Feet Per Hour. | Candle Power per Cubic Foot per Hour. | Candle Power per Cubic Foot. | Rate of Gas Consumption. |
| | | | | | Cub. Ft. |
| $6\frac{3}{4}$ in. by $2\frac{3}{8}$ in. diameter. Air-holes closed and deck-plate removed | 77 | 4·4 | 17·5 | 19·9 | 3·45 |
| Ditto. Air-holes opened | 121 | 5·95 | 20·3 | 21·5 | 5·5 |
| $9\frac{7}{8}$ in. by $2\frac{7}{8}$ in. Air-holes closed | 70 | 4·36 | 16·0 | 16·5 | 3·95 |
| Ditto. Air-holes opened | 128 | 6·75 | 19·0 | 21·3 | 5·5 |
| 7 in. by 2 in. Mica plain, without deck-plate | 109 | 4·9 | 22·2 | 22·3 | 4·75 |
| Ditto. Perforated and with deck-plate | 133 | 5·7 | 23·3 | 23·4 | 5·70 |

From these later tests the "Illuminating Engineer" states its conclusions to be that the long air-hole chimneys give the highest total candle power; that air-holes increase the efficiency obtainable with chimneys of more than 2 inches diameter; but that the highest efficiency (as previously deduced) is obtained by the use of small plain chimneys. It would seem strange that, while all the tests prove that straight unperforated chimneys yield

the greatest duty in candles per cubic foot, this last set of experiments is so far contradictory, in that it indicates a greater efficiency with air-hole chimneys compared with the same chimneys with the holes closed. The reduction in efficiency in the latter case may, however, be merely apparent, and due either to the shape and size of the glass as compared with a small plain one, or possibly to slight obscuration of light rays by the mica strips. In any case it is to be seen that the greater duty with perforations is only obtained with a much larger gas consumption, for which many burners are not adjusted, and is therefore beyond attainment by the ordinary consumer.

## A NEW RECORDING GAS CALORIMETER.

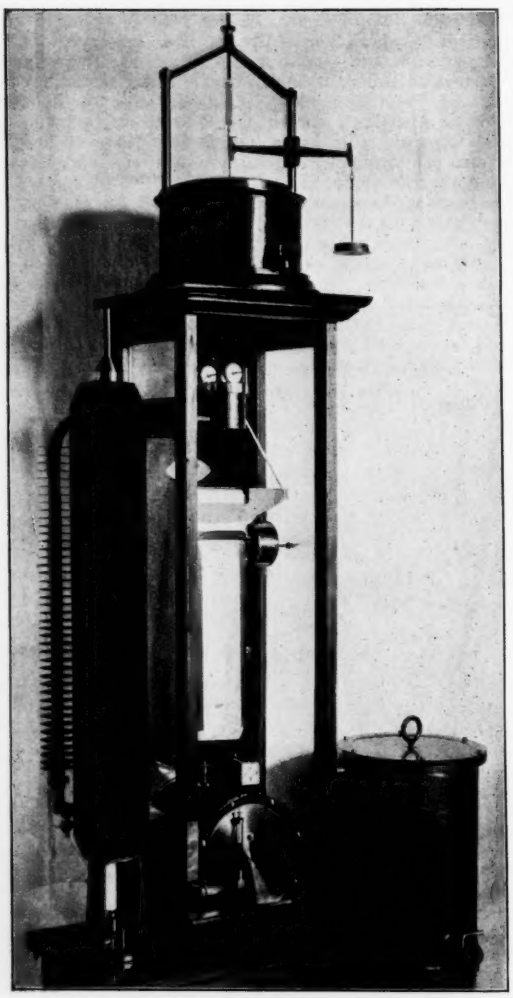


Fig. 1.—The Beasley Calorimeter.

THE changed conditions in the production and use of gas for illuminating, heating, and power purposes which have come about during the past few years have caused attention to be directed to the methods employed for testing its quality. In the department of lighting, the introduction of the incandescent mantle has necessitated, as our readers are aware, the adoption of another standard than that of candle power for testing the gas employed with it; while for cooking-stoves, heating appliances, and gas-engines, it is obviously of greater importance to have gas of a definite heating value than to have it of a particular light-giving power. It is consequently within the bounds of probability—indeed, there is marked evidence of it in existence—that in the not-distant future gas will have to be supplied of a standard calorific value. This fact has led to the production of an instrument—the calorimeter—which will indicate this value clearly and accurately, and at the same time automatically. The calorimeters now in use are constructed mostly on the absorption principle—the heat developed by the burning gas being absorbed by water contained in a jacket surrounding the flame. If the quantity of gas burnt and the amount and temperature of the water used are known, the calorific value of the gas may be ascertained by calculation. Calorimeters working on this principle give a thermal value of the fuel tested which is not comparable with actual results in practice—being, in the case of some gases, considerably too high. For the new instrument about to be described, however (which is constructed by Messrs. C. H. & F. G. Beasley, of Smethwick), no

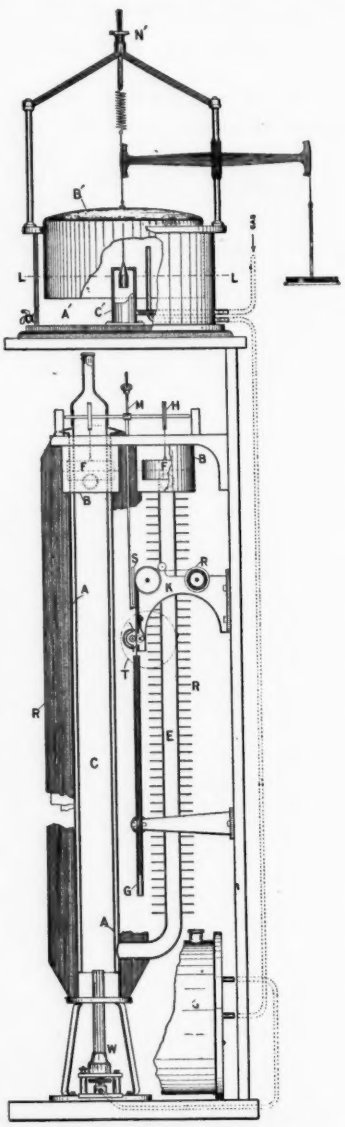


Fig. 2.—Section of Calorimeter.

water supply is required, and there is nothing of a complicated nature in its mechanism, nor are there any delicate parts liable to give trouble in the hands of unskilled people. The advantages of such a calorimeter should appeal to all who require continual gas testing, and are desirous of saving the expense of analyses. It is entirely automatic in action and self-contained; and it gives, it is said, clear permanent records of the calorific values of the gases tested.

The main idea of Messrs. Beasley has been to design a calorimeter of which the indications should be a valuable guide to an engineer by not representing the total number of heat units actually generated by the burning (in air) of a unit weight or volume of a gas, but only the number available for practical purposes. When a gas containing free or combined hydrogen burns, water is formed; and if this escapes from a gas-engine or any other appliance in the state of vapour, a considerable percentage of the total heat of combustion of the gas is lost. It is apparent, therefore, that of two gases having the same total heats of combustion, the richer, from a practical standpoint, is the one containing the least hydrogen. A gas composed of equal quantities of hydrogen and carbonic oxide has a high-value calorific power of 344, and a low-value one of 319. But supposing the composition of the gas to change to 75 per cent. of hydrogen and 25 per cent. of carbonic oxide, the high and low values would alter respectively to 344 and 307. A calorimeter recording high powers would indicate practically no change in the quality of the gas, notwithstanding the fact that the general behaviour of gas appliances and the outputs of gas-engines would fall off considerably. While these may be somewhat extravagant examples, they nevertheless serve the purpose of demonstrating the importance of having an instrument which records the low and not the high values for the calorific powers of gases. In water-cooled calorimeters, the products are brought down to the temperature of the air by a stream of water; the rise in temperature of the water being a measure of the calorific power of the gas. In the Beasley calorimeter, the gas is burned in a good supply of air in a well-radiated chimney, the average temperature rise of which is directly proportional to the heat developed by the flame. And since the products of

combustion leave the instrument at about 70° C., no water is condensed; and by virtue of this the calorimeter gives only the low-value powers.

The new calorimeter is shown in the accompanying illustrations; fig. 1 being a perspective view and fig. 2 a sectional diagram. A U-shaped vessel, one limb of which is formed by the annular space A, between the concentric walls of a vertical chimney C, is provided at the top of each limb with a small tank B, and contains enough oil to fill the tube A (which is a jacket surrounding the chimney) and the cold limb E, and also to partly fill the two tanks B. The gas to be examined is burned at an atmospheric burner W at the bottom of the chimney, and the oil in the heated limb A rises to a level above that in the cold limb corresponding to the increased temperature. The difference of level is therefore a measure of the calorific value of the gas, and is recorded automatically by means of two floats F, situated in the tanks B, and connected by threads to two pulley-wheels arranged upon a horizontal spindle H. This spindle rotates as the floats rise and fall respectively, and operates a lever M carrying a marker. The latter traces a diagram upon the moving band of paper actuated by the clockwork T, and ruled with a scale which indicates the low calorific values. The paper gear is shown built upon the bracket K. The supply for a week's run is wound on a wooden spool and is transferred for use to the roller P. By means of the clockwork the paper is drawn over rollers passing the back of the scale S in contact with the marking-pen M to the long paper guide G, which is sufficiently long to always allow the exhibition of a 24 hours' record.

To secure the constant stream of gas to the calorimeter, it has been necessary to use a pressure regulator and a stream controller, for which a patent has been applied for. The pressure regulator (shown above the calorimeter) is of the ordinary type; but the dimensions and weights of the different parts have been carefully studied, so as to meet present requirements. The outer vessel $A^1$ is filled with oil to the level L, and forms a lute to the bell $B^1$, from the centre of which is suspended by a light chain a somewhat heavy cone. For normal gas pressures, the bell is counterpoised by a spring and balance-weight D. An increase or decrease in the pressure raises or lowers the bell, restricting or opening the gas passage between the suspended cone and a feather-edged seating in the chamber $C^1$. The bell, being large, is very sensitive to small changes of pressure, and the regulator will maintain in the bell a constant pressure of 5-10ths of an inch of water, which is the pressure necessary to work the controller, and this against pressure variations from 1 inch to 10 inches in the main gas supply. This form of regulator has been tested and found to behave perfectly, even when the cone and seating are almost covered with tarry matter from producer gas.

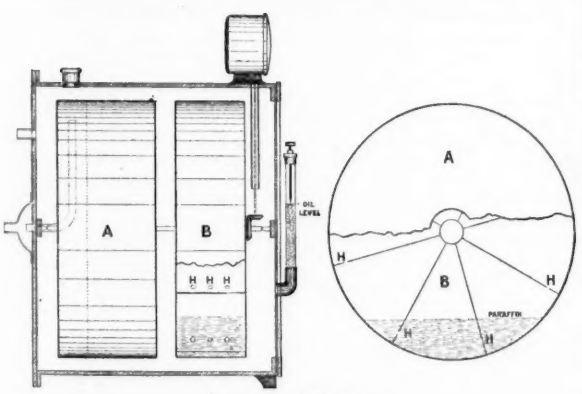



Fig. 3—Gas Controller.

The flow of gas through a pipe or orifice depends directly upon the square root of the actuating pressure and the area of the orifice. To obtain a constant stream of gas, therefore, it is not only essential to have a constant gas pressure, but also a constant resistance to the flow of gas. The constancy of the resistance offered to a stream of gas by the jet of an ordinary burner cannot be depended upon, particularly in cases where the gases are not clean; and on this account it has been necessary to design a special form of controlling apparatus, shown in fig. 3, which regulates the flow of gas independently of the burner-jet. The principle of this controlling apparatus is the regulation of the delivery of the gas by maintaining a constant speed for the drum of a gas-meter.

The meter drum A is directly coupled to the controlling drum B, which is divided into six or more compartments, and contains a definite quantity of rectified paraffin. The flowing of the paraffin from compartment to compartment through the small holes H constitutes a definite brake to the rotation of the drum system; and, actuated by pressure maintained constant by the pressure regulator, the meter-drum is turned at a constant speed and delivers a uniform stream of gas.

Since the magnitude of the gas stream is independent of the size of the burner-jet, the latter is made unusually large, and much tarry matter may deposit itself in the jet without in the least affecting the constancy of the gas stream. The atmospheric burner

Fig. 4—Atmospheric Burner.

used in connection with the calorimeter is shown in fig. 4. The air inlet is easily adjusted by the large milled screw; and a special feature of the burner is its construction for readily allowing the removal of a dirty gas-jet and its replacement by a spare clean one. The steatite rosehead shown in the illustration has been dispensed with in the latest type of burner.

Considerable attention has been given to the testing of the Beasley calorimeter; and the patentees claim that it is accurate, very sensitive, and thoroughly reliable. A test was carried out in which commercial hydrogen from a cylinder was burnt under the calorimeter. By analysis, the gas was found to have a low-value calorific power identical with that given by the calorimeter—viz., 274 B.Th.U. per cubic foot. The hydrogen was diluted with different volumes of nitrogen; and the following tabulated results show the degree of sensitiveness of the instrument:—

| Stream of Gas in Cubic Feet Per Hour. | Percentage Composition of the Mixed Gases. | | Calorific Values. | |
|---|---|---|---|---|
| | Commercial Hydrogen. | Nitrogen. | Deduced from Composition. | Recorded by Calorimeter. |
| 5·18 | 100·00 | .. | 274 B.Th.U. | 274 B.Th.U. |
| 5·18 | 98·99 | 1·01 | 271 ,, | 271 ,, |
| 5·18 | 97·30 | 2·70 | 267 ,, | 266 ,, |
| 5·18 | 91·99 | 8·01 | 252 ,, | 252 ,, |
| 5·18 | 86·00 | 14·00 | 236 ,, | 237 ,, |

The calorimeter has also been tested and found to be very insensitive to normal changes—(*a*) in the temperature and humidity of the atmosphere, (*b*) in the condition of the radiators, and (*c*) to the state of the inside of the chimney. In one test made, the steady records of the calorific value of a homogenous gas were not affected by as much as 1 per cent. by the settling of large quantities of dust on the radiators; nor were they in a second case by the abnormal coating of the inside of the chimney with soot from the burning of machine oil.

The gases used for standardizing the instrument are hydrogen and carbonic oxide—the latter gas being very convenient, as it can be prepared in a very pure state by decomposing formic acid with sulphuric acid. The gas is generated (in large flasks), washed with water and caustic soda, and then stored in a large gasholder. It is tested in the Hempel apparatus for carbonic acid (which should be absent), and also for oxygen, &c. But for the more particular estimation of the total carbonic oxide present in what should be practically pure gas, an apparatus has been specially designed, which gives very uniform results, as shown by the following analyses of two samples: No. 1, total CO = 98 per cent.; No. 2, total CO = 97·97 per cent. The calibration of the instrument is also checked by the use of pure hydrogen.

The calorimeter described is finished in polished slate and mahogany, stands about 7 feet high, occupies a floor space of approximately 3 square feet, and weighs about 2 cwt.

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The prospectus has been issued for the Franco-British Exhibition of Science, Arts, and Industries, to be held at Shepherd's Bush next year. In the list of the Groups and Chairmen are the following: Constructional Engineering, Sir Alexander Binnie, Past-President of the Institution of Civil Engineers; Electrical Engineering, Dr. R. T. Glazebrook, F.R.S., President of the Institute of Electrical Engineers; and Gas Engineering, Mr. H. E. Jones, M.Inst.C.E., Past-President of the Institution of Gas Engineers.

We learn from the "Engineer" that a pumping-engine of exceptional size has recently been ordered for the city of Nashville (Tenn.). It will have a daily nominal capacity of 20 million gallons of water, against a head of 390 feet, and will be operated by steam at a pressure of 160 lbs. per square inch. The plunger speed is 240 feet per minute at 20 revolutions of the engine; the stroke being 6 feet. The duty guaranteed is 175 million foot-pounds per 1000 lbs. of dry steam consumed by the engine and all its auxiliaries. The total horse power will be about 1550.

An unusual pumping plant forms part of the water-works of Casino, New South Wales. A well 10 feet in diameter and 55 feet deep was sunk 200 feet from a river, from which the supply is drawn through a 12-inch iron pipe, its intake end being supported on a timber staging and fitted with a movable arm and screen. The water is delivered by a four-stage centrifugal pump in the bottom of the well, provided with a vertical shaft driven by a 30 H.P. steam-engine. The water is discharged into a concrete reservoir, 139 feet above the pump and 3700 feet from it, through a 6-inch main, so that the total head against which the pump works is quite high for a capacity of only 250,000 gallons daily.

# A FRENCH ENGINEER'S INSTRUCTIONS FOR THE MANAGEMENT OF REGENERATIVE FURNACES.

At a time when more attention than ever is being given to methods of carbonizing, and when the gas engineer and manager is endeavouring to extract the utmost from the working of his retort-settings—of whatever type they may be—it is often of profit and interest to see and record what are the views and practices of engineers abroad. This it is which frequently makes a visit to Continental gas-works so beneficial—not perhaps in directly supplying the visiting engineer, or deputation, with any definite apparatus or method to be adopted, but rather in the prompting of some view or idea originating from the conditions and aims of others.

Particularly may this prove to be the case in regard to retort-house working; for though the extraction of the greatest serviceable amount of gas from a given quantity of coal may be the object of gas-makers all the world over, yet there are innumerable ways and means by which this one object can be achieved. Even when identically the same type or system of furnace and retort-setting is adopted, it will be found that there are many divergencies in practice and procedure between one installation and another. Times and methods of charging and discharging, of scurfing retorts, of cleaning ascension pipes, of regulating the seal of dip-pipes, of manipulating the hydraulic main tar and liquor, of controlling the chimney draught, of managing dampers, of firing the furnace, of conducting the clinkering—all these, and a host of other points, may vary considerably in different works having the same plant and the same object in view. Comparisons, in such cases, are not odious, but proper and beneficial.

Where the comparison is instituted, not between the works of one town and another, but between the practice of one country and another, then the technical relation is not so close; and therefore the result of the comparison is frequently more striking and sometimes more suggestive. Distillation and purification are the two departments of gas manufacture which, being the most important, offer the greatest scope for varying views and diverging practices. In purification, the objects striven after are not always the same, and the materials used may be different. In carbonization, the aim is practically constant, and the appliances used only vary in degree. What variation there is between the carbonizing methods of gas engineers of different countries probably arises from the differences of value in the raw material, coal and its residual, coke.

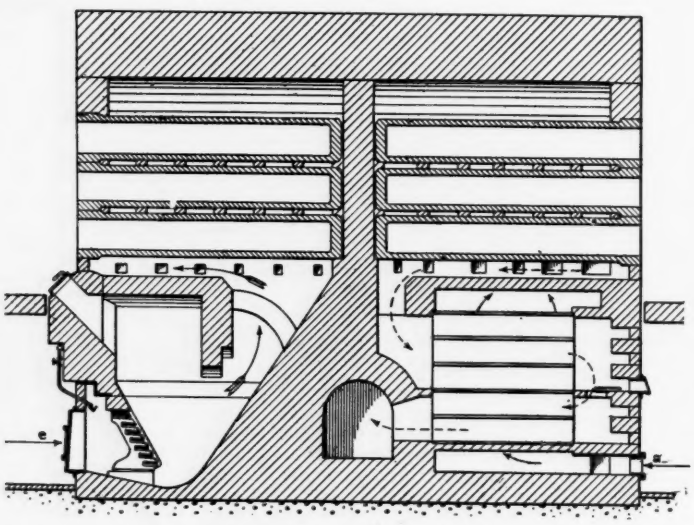
In Great Britain, both these commodities are too plentiful for the extreme of scientific and economical treatment to have full play; but in France and Italy, for instance, it is not so. Therefore more exhaustive arrangements may be adopted to extract the fullest benefit from the more expensive materials operated upon. This, in the opinion of some, leads, in retort-house practice abroad, to more complicated and more costly furnaces, to higher temperatures for carbonization, to less fuel expenditure, and to greater care with the coke. Be this as it may, the investigation of points such as these can only be a fruitful source of research.

For analogous reasons to these, the examination of foreign methods of management of retort-beds, as compared with our own, may be useful; and we therefore welcome the views of a well-known French engineer and builder, M. Derval, of Paris, upon the subject. Trained in the Ecole Centrale, and ever since practising solely as a furnace specialist, not limiting himself by any means to gas-works' ovens, but designing and erecting furnaces for glass-works, metallurgical purposes, pottery and porcelain, &c., M. Derval, as the successor to the earlier French furnace designers, MM. Gaillard, Haillot, and Radot, has achieved considerable reputation, and is rightly regarded as a leading expert, both on the theory and practice of industrial heating. What he says, therefore, on the subject of regenerative furnaces is worthy of every consideration; and as he has recently put into pamphlet form some practical "Instructions for the Drying, Lighting Up, and Management of Regenerative Furnaces," we give a translation of them for the benefit of English retort-house workers. We do so the more readily because the only English parallel to it with which we are acquainted is contained in a small book written by Mr. Maurice Graham, under the title of "Practical Hints on the Construction and Working of Regenerative Furnaces;" and this has long been out of print. M. Derval's practical advice may therefore prove of considerable use, more especially to those directly concerned in the management and daily working of gas-works' retorts, and who may not have occasion to fathom the mysteries of regeneration.

The pamphlet referred to undoubtedly fills a gap in French gas literature, and we believe it will not be without its utility in an English form. It may be added that though the instructions given are illustrated by M. Derval's own designs of furnace, they are also generally applicable to all regenerative retort-beds. Four types of furnaces are dealt with. There is first the simple regenerative or recuperative furnace, based on the ordinary principle of regeneration; the fire-bars being stepped down in ledges. An extension of this simple regenerative system is that with double combustion, in which a second or double supply of secondary air is introduced at a given point in the setting, so as to ensure the complete combustion of the producer gases. This arrangement is particularly adopted for through retort-beds with only one producer, and for inclined and vertical retorts. The third type is known as double regeneration; the primary air in this case being heated before it is led under the horizontal fire-bars of the furnace. Lastly, there is a special form of producer adopted with hinged grate-bars arranged for burning coke dust mixed with 30 or 40 per cent. of fine caking coal. We will now give M. Derval's instructions for managing these different types of furnaces and settings.

### Drying the Beds before Placing the Retorts.

This drying is not indispensable; but as it allows of ultimately expediting the working of the retorts, and as it protects them from certain movements of the brickwork which might lead to their cracking, if all the necessary precautions were not taken at the moment of lighting up, it is not a bad thing to have done when circumstances allow of it. The brickwork of the producers and the regenerators being finished, and the retort supports and nostril-pieces being in place, the retort-arches are closed by a wall 11 centimetres (say, 4½ inches) thick, of red brick. All the dampers and sight-holes, with the exception of the main flue dampers, are shut; so that the chimney draught can only affect the fire-bars of the producer, the door of which must be left half open. Then a small wood fire is laid on the fire-bars (or on part of them); and this is gradually added to during the first two days. When the draught has thoroughly caught hold, and the brickwork has begun to heat, coke is added to the fire, and the heating up is continued with this fuel. At this moment, also, the secondary-air dampers should be slightly opened, so as




*e*, primary air. *a*, secondary air.

Note.—The feathered arrows indicate the course followed by the gas. The unfeathered arrows indicate the course followed by the secondary air. The dotted arrows show the waste gases.

**Fig. 1.—Section through Centre of Producer and through Centre of Regenerator.**

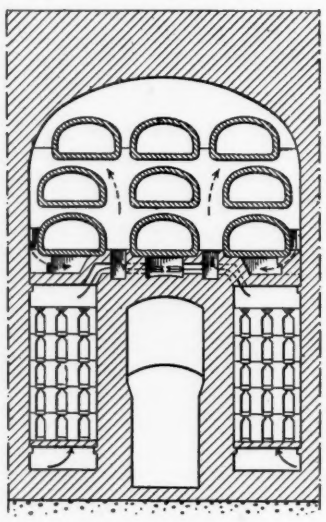


**Fig. 2.—Cross Section.**

to carry off the steam which is formed in the ducts for the circulation of the air. The draught is then gradually increased, and consequently the intensity of the fire, until the drying is finished —that is, until the outside walls of the structure are just warm, and no more smoke is seen to issue from any of the joints of the brickwork.

This operation lasts for about a week and requires constant supervision, especially at night when there is a tendency for the stokers to overcharge the fire-bars so as to have a longer interval of rest. Such variations in the heat of the furnace have a very bad effect on the brickwork; and it is necessary to see that the fires are fed often, and in small quantities—a certain space always being left between the fuel and the nose of the producer. If the bench being dried is worked by a new chimney, it may be necessary, at the beginning of the drying, to start the draught by a small fire in the base of the chimney. When the drying is completed, all the dampers and openings of the bed must be shut, so that the brickwork can cool gradually. Taking down the mask or temporary walls can then be proceeded with.

### Drying the Beds before Starting to Work.

In order to dry beds which have been newly built, or in which new retorts have been mounted, it is necessary:

1.—To open all the dampers, except those for the inlet of the secondary air in the bottom of the regenerators—that is, dampers *a* shown on fig 1. Where the furnace doors are provided with fan slide, or ventilator, and openings, these should be fully opened, so that the primary air can enter freely under the fire-bars.

2.—To make a coke fire on the horizontal grate, or on the false or spear bars (fig. 3) if the producer has a stepped grate. The intensity of the heat should be increased little by little, so that the brickwork may be heated as slowly as possible. This is especially necessary when the retort-beds are entirely new.

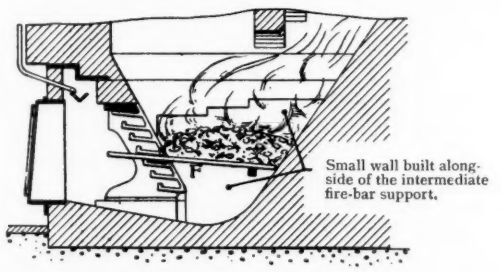



**Fig. 3.—Simple Regenerative Furnace.**

At the commencement of the operation—that is, during the first two or three days (if time be not pressing)—the waste-gas dampers should be opened very slightly. The sight-hole plugs at the top of the façade of the bench should also be opened to allow the greater part of the steam to get away without passing through the regenerators, where it might partially condense if the weather was very cold. But more often it is the practice to open the waste-gas dampers wide enough for the mixture of air, gas, and steam to have a sufficient volume, so that there will be no condensation in the passages of the regenerators. In either case, the opening of the sight-holes in front of the bench does not cause any inconvenience during the beginning of the drying; but it is, of course, necessary to close these holes when the temperature has to be raised.

The furnace-bars ought not to have more than 40 to 50 centimetres (16 to 20 inches) thickness of coke upon them, because above this depth, there is risk of gas firing. To avoid making carbonic oxide gas, it is advisable to allow a certain space between the fuel placed on the grate and the nose of the producer, so that there may always be a certain amount of air in excess.

Towards the end of the drying, when the fuel bed begins to get rather thick and the producers are quite red, the feeding doors of the producers can be left half open, so that the air can burn any carbonic oxide gas which may be formed. The false grate F (fig. 3) has for its object the protection of the metal parts of the stepped grate by carrying the fire towards the bottom of the producer; but it obviously is of no use if there is a horizontal grate, as in furnaces for burning coke dust, or in those having double regeneration (see figs. 5 and 6). When the producers are very wide, and have one or more intermediate supports for the fire-bars, it is generally preferable to reduce the grate surface by building small walls by the intermediate supports and stopping up the spaces between the stepped grate-bars with bricks and grouting. Where there is a horizontal grate, or where false fire-bars are used, it will suffice to place a few bricks on the flat on the bars, and throw a layer of cinders and clinker on to that part of the grate which is not required to be used.

During the whole of the drying, the ventilator openings in the furnace doors ought to be full open. The movements in the brickwork must be watched, and the buckstays and tie-rods, &c., must be loosened in accordance with the usual practice. Where there are no springs, it is well to place between the buckstays and the plates of the tie-rods small wooden boards or lead plates, which can be crushed under the expansion of the brickwork. When the whole bench has been newly built, the drying period ought to last eight to ten days; and it is always advisable to increase this period in order to avoid the brickwork expanding in an abnormal manner through over-forcing the fires. If the beds have already been in fire, the period of drying and gradual heating up again can be reduced to about half—viz., 4 or 5 days. At the end of this time, if the drying has been properly done, the working part of the oven will be found to be a dull red, and a start in gas firing can be made under good conditions.

Two or three days before commencing gas firing—that is to say, when the temperature of the bed has begun to rise—a half charge of coal should be put into the retorts, 90 or 100 kilos. (about 2 cwt.), and the caps of the ascension pipes should be opened, so that the gas produced can escape freely. Towards the end of the drying, the whole of the width of the grate is generally utilized by demolishing the small walls built behind the intermediate supports, or by taking out the bricks placed temporarily between the bars of the stepped grate.

### Commencement of Gaseous Firing.

The coke fire on the grate being quite brisk and the nostril pieces being brought to red (which ought always to be endeavoured to be reached without using wooden laths or a gas-flame, as explained later), it is necessary: (1) To take away the bars of the false grate (when there is one) and to allow the incandescent coke to fall on to the bottom of the producer. Take away the clinker. Fix the real bars on their cast-iron supports. Allow the coke to light itself, and gradually charge the producer until the nose of it is covered by about 10 to 15 centimetres (4 to 6 inches) of coke. While firing up, leave partly open the charging door of the producer; taking care, however, to regulate the main flue dampers in such a way that the draught will be strong enough to prevent the flames coming out of the charging door, which might heat it and misshape it. After letting the fire fall on to the bottom of the producer, it is well to allow a little water to run into the basin of the producer. In this way, direct firing—that is, without the production of carbonic acid—is continued until the nostrils are really brought up to red. The actual gaseous firing is then proceeded with in the following way: (1) The fan openings in the furnace-doors are, of course, to be wide opened, so that primary air can always have free access to the grate. (2) Half-open (that is, from 7 to 8 centimetres, about 3 inches) the two secondary-air slides (*a* fig. 1) the two main flue dampers still being opened as they were during the previous heating of the bed. (3) Gradually charge the producer—say, with 3½ qrs. of coke at a time—until carbonic oxide gas is seen to burn above the nostril holes. Put in the successive charges of coke when the preceding charge is well alight; but when once the gas is ignited, the producer can be completely filled up to the charging door. When the nostrils are very hot, and there is no doubt about the gas igniting on arriving at the nostril holes, the producer can at once be fully charged with dry coke after having opened the secondary-air slides. On the other hand, when the temperature at the nostrils is doubtful, it is better, after having opened the secondary-air slides, to burn large wooden laths above the line of nostril holes. These generally catch light on coming in contact with the hot air, and ought to be sufficient in number to keep up the combustion during a quarter-of-an-hour. Immediately after the introduction of the first laths, charge the producer fully and as quickly as possible with dry coke, taking care to keep going the wood flame above the nostrils until the gas is seen to ignite freely, which generally happens after a few minutes. (4) When the gas is well alight and the retorts near the nostrils begin to get red, it is necessary to diminish the

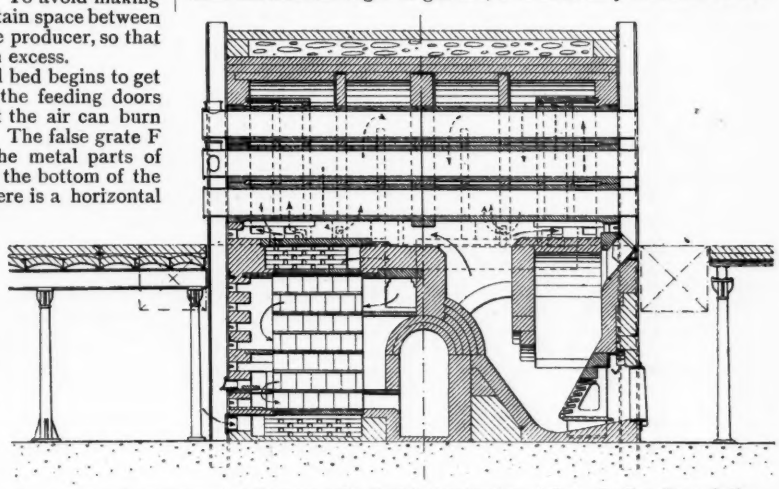


**Fig. 4.—Simple Regenerative Furnace, with Double Combustion of Gas. Section through the Centre of a Double Bed of Nine Retorts.**

intensity of the heat by reducing to only 2 or 3 centimetres (about 1 inch) the opening of the main-flue dampers. The secondary-air dampers can be kept as they were at the moment of gas firing. If there is an excess of gas in the bed, it can be got rid of by suitably closing the primary-air dampers, or else the ventilator openings in the furnace doors.

In principle, the starting of gas firing of retort furnaces ought always to be done with a large excess of air at the nostrils—at all events, during the first few hours. It is essential to watch carefully that the temperature of the bed does not rise too rapidly, which can be easily prevented by judicious manipulation of the different dampers, especially those for the main flue. A too sharp rise of temperature would lead to cracking of the retorts and to displacement in the brickwork.

The drying and starting in operation of furnaces with double combustion (fig. 4) are carried out in the same way—that is, without considering the working of the secondary-air dampers intended to complete the combustion of the gas. This operation is carried out later when the retorts begin to carbonize coal.

The same applies to furnaces with double regeneration (fig. 5), the drying and gaseous firing of which are effected while the furnace doors are partly open. The regulating of the slides for the primary air (which, in ordinary working, has to be previously heated in the base of the regenerators), is only done after the furnaces have worked for a day or two as simple regenerators—that is, with the introduction of cold air under the fire-bars.

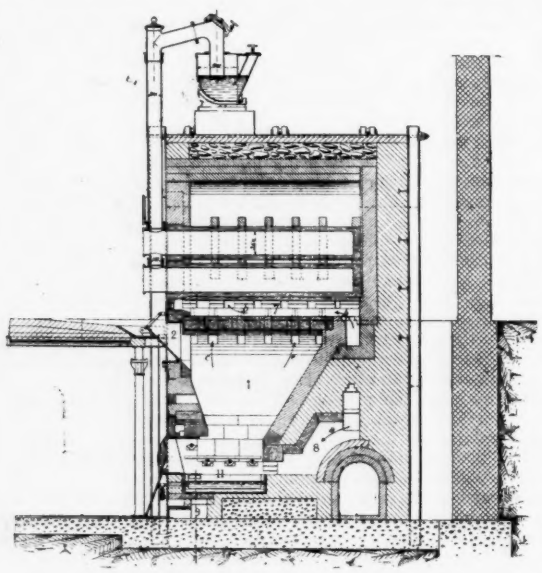


**Fig. 5.—Double Regenerative Furnace. Section through the Centre of the Producer.**

### Regulating the Furnace.

When gas is being produced in sufficient amount and the interior of the oven begins to get red, a commencement can be made with the regulation of the intensity of the heat by shutting the furnace door (which has up to now been open) and by gradually reducing the opening of the secondary-air slides. The quantity of secondary air arriving at the nostrils should always be sufficient to burn off completely the gas produced. Whether there is an excess of gas can be found out by opening one of the sight-holes placed in front of the bench. If the bed is under pressure (as it ought to be), the gas comes out and lights itself, burning with the blue colour characteristic of carbonic oxide. When the bed is quite hot, the best method of ascertaining the presence of an excess of gas is by opening one of the sight-holes placed in the bottom part of the regenerators.

Yet another method, and a very practical one, of seeing if there is an excess of gas, and of finding out whether the bed is under pressure or in vacuum, consists in inserting in the bed through one of the sight-holes a sufficiently large piece of wood. If this chars, there is too much gas. If, on the other hand, it burns with some degree of liveliness, there is too much air in the bed. On principle, it is always better that combustion should take place with a slight excess of air; and it is necessary to be careful to get a certain pressure in the setting. This pressure can be obtained either by reducing the draught, or by increasing the opening of the secondary-air slides, if there is excess of gas in the bed.

The retort-bed being under pressure (or under a vacuum), the amount of gas can, of course, always be increased or diminished by means of the primary-air slides or the ventilator openings in the furnace doors. Generally, it is not necessary to modify the working of the furnace doors; and the same applies to the gas-dampers, which are sometimes put at the gas outlet of the producers. In short, hot air arrives more easily at the nostril holes than gas does; and this tendency allows the proportion of air and gas to be duly regulated by a judicious adjusting of both the secondary-air and waste-gas dampers. When there is a great excess of gas in the bed, which especially occurs after clinkering the fire and after charging the producer, it is a good thing to close the ventilator openings of the furnace-doors for half-an-hour or an hour. When the regenerators are of considerable height, this excess of gas can also be got rid of by suitably opening the secondary-air slides. There even exists apparatus which allows of effecting this alteration automatically; but its adoption does not at present appear to be practicable.

It is to be observed that if the draught of one side of the bed be increased, there may appear an excess of gas there, the presence of which can be ascertained by looking into the bottom of the regenerator. It will then be necessary to cause this gas in excess to disappear by opening a little the secondary-air dampers placed in the hottest regenerator—that is, in furnaces with double regeneration. One can also satisfy oneself that there is not too much gas in the bed by opening one of the sight-holes of the first waste-gas flues in the regenerator. If the flame is smoky, it is because there is an excess of gas. In the same way, one can be satisfied that there is not an excess of air, by putting some wood shavings into the first passages of the regenerator. If the wood quickly catches on fire, there is evidently an excess of oxygen, and it is necessary to close down a little the air-dampers of the regenerators. To carry out this test, it is necessary, of course, to prevent the outside air from entering by the sight-hole, and to close this by a little glass frame—if the sight-hole plugs are not provided with mica fronts.

With a little practice, stokers very quickly become able to tell the way a regenerative bed is working, by simply looking through a sight-hole; and it rarely happens that slides or dampers have to be touched when once the retort-bed has been well regulated. So as to prevent the stokers from too frequently touching the slides, it is a good practice to fix padlocks on them, the key of which is kept by the retort-house or works' foreman.

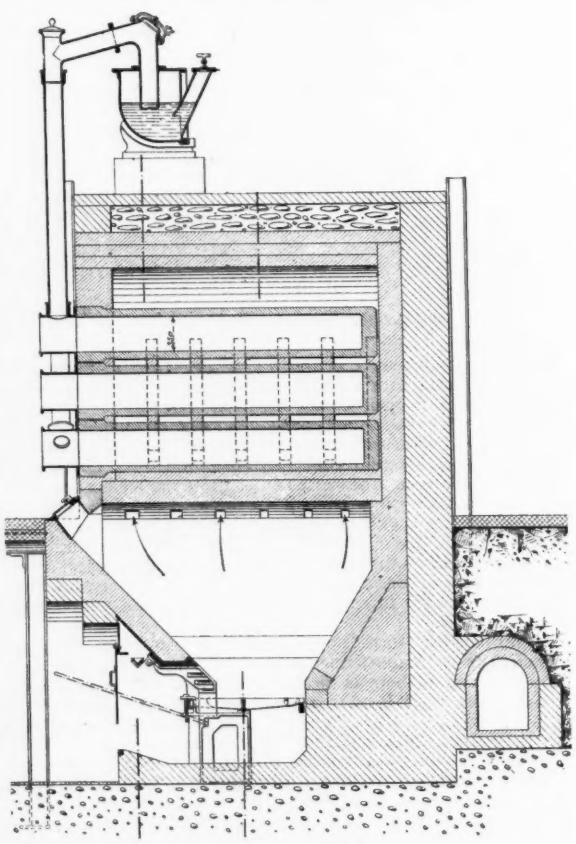


**Fig. 6.—Special Furnace for Burning Coke Dust mixed with Small Coal. Section through the Centre of the Producer.**

An analysis of the waste gases is also a good way by which to ascertain how the bed is working; but it must be made by an experienced person, who is quite familiar with the retort working at different hours of the day. When an analysis is to be made, it is a good precaution to see that all the plugs and cracks in the front walls are properly stopped up, so as to prevent cold air getting into the waste-gas flues. These inlets of cold air have important effects on the working of the beds; and the greatest care should be taken to avoid them. This last observation applies equally to the front walls of the beds, especially when they are working under a vacuum—that is, with a certain draught or pull—which is sometimes unavoidable.

The draught ought to be regulated in such a way that the interior of the bed may be slightly under pressure, which can be

seen by the small tongues of flame that appear at the sight-holes at the top of the bed front. When producers have a small grate-bar area, this result is sometimes difficult to achieve by merely manipulating the air and gas dampers; but it is necessary to try to obtain it, because everyone admits that producer beds work so much better the more they are under pressure. Stokers must therefore take care the beds are not under suction, but that the flames always have a tendency to come out from the setting.

In retort-beds with double combustion (see fig. 4), the pressure behind the front wall ought to be very clearly marked, on account of the longer way the flames have to go before reaching the regenerator. With these beds, it is necessary carefully to avoid working under a vacuum, because too great a draught would have the effect of sucking in too much air through the openings placed behind the dividing wall of the bed, and the combustion would be too active in the bottom of the bed. In some beds of inclined and vertical retorts, which are especially suited for double combustion of gas, this inconvenience is reduced, because the second admission of air is regulated by dampers placed in front of the regenerators; but in these beds, as in beds of horizontal retorts, it is always better to increase the pressure of the flames against the front wall as much as possible, if only to prevent cold air getting in through cracks in the brickwork.

The draught of each bed being able to be regulated by the waste-gas dampers placed in the base of the regenerator, the general damper, which is placed at the foot of the chimney or at the end of the retort-benches, could be done away with. But this damper is very useful to counteract the variations which arise in chimney draughts in consequence of a change in temperature or from any other cause. A very delicate gauge, connected to the main flue between the bench and the chimney damper allows of these variations being easily corrected by altering the general waste-gas damper.

*(To be continued.)*

# COMPARATIVE VALUES OF THE THREE FLAME STANDARDS OF LIGHT—THE CARCEL, THE HEFNER, AND THE VERNON HARCOURT.

## REPORT ON THE RESEARCHES CARRIED OUT AT THE TESTING LABORATORY OF THE NATIONAL ACADEMY OF ARTS AND TRADES, AND AT THE CENTRAL ELECTRICITY LABORATORY, OF PARIS.

By M. Perot, Director of the Testing Laboratory, and M. Janet, Director of the Electricity Laboratory.

**[Communicated at the Meeting of the International Committee on Photometry at Zurich, July 18-20.]**

In accordance with the decision arrived at by the International Photometric Committee at its (first) congress at Zürich, M. Th. Vautier, the President of the Committee, requested the Testing Laboratory of the National Academy of Arts and Trades to be good enough to undertake the photometric comparison of the three flame standards most commonly in use—viz., the Carcel, the Hefner, and the Vernon Harcourt. The same request was made to the Central Electricity Laboratory, which had several times before had occasion to investigate the usual standards of light. A paper, published in 1898, on the comparison there of the Carcel and Hefner lamps has been quoted by Dr. Bunte in the report which he presented to the International Committee ("Journal," Vol. LXXXIV., p. 957).

Work was started, therefore, at the Academy of Arts and Trades in 1905, and at the Central Electricity Laboratory in 1906; the results obtained are summarized later. This work has been supplemented, finished, and confirmed by joint work carried out in June and July, 1906. The photometric tests at the testing laboratory of the Academy of Arts and Trades have been made by MM. A. Perot, the Director, and E. Langlet, an Assistant; and those at the Central Electricity Laboratory by MM. F. Laporte, the Assistant Director, and M. Jouaust, the Superintendent of the Laboratory.

### I.—Work Carried out at the Testing Laboratory of the Academy of Arts and Trades in 1905.

*Mode of Working.*—The measurements have been made by the method of direct comparison in order to determine the relation between the intensities of the sources of light; an intermediate source has not been resorted to. This method has been adopted in order to depart from the experimental arrangement usually followed, and to endeavour to eliminate any systematic error which may creep into measurements habitually being made. This error might have been ascribed to the difference of colour of the sources, which is appreciable enough as between the Carcel and the Hefner. Making comparisons between the three sources simultaneously, it was possible to ascertain directly the relation between two sources, and afterwards to deduce the two other relations measured; one of the sources being regarded as an auxiliary source. It is certain that the sensation of equality of illumination for the discs when the colour is different is a physiological sensation, and that it must depend as much on the observer as on the instrument by which it is ascertained.

Representing the Carcel lamp by the symbol C, the Hefner by H, and the Vernon Harcourt by V, the measurements made in 1905 at the testing laboratory have given to the ratio $\frac{H}{C}$ a value higher by nearly 3 per cent. than that which is obtained from the product $\frac{V}{C} \times \frac{H}{V}$. It is right to assign only a relative significance to this fact, for it depends on a certain number of factors, among which the instrument by which the observations were made must have particular importance. The apparatus used for the direct measurement of the ratio $\frac{H}{C}$ was a photometer with concentric discs. In a series of experiments made in conjunction with the Central Electricity Laboratory, described further, the divergence vanished. But there were more observers, and a contrast type of photometer was used. In the series of operations now in question, the sources of light were at the points of an equilateral triangle, of which three photometer benches formed the sides. Two observers made simultaneous measurements of the ratio between two sources. The order of the observations by the operators was—

| Ratio | $\frac{V}{C}$ | $\frac{H}{C}$ | $\frac{H}{V}$ |
|---|---|---|---|
| (1) | Perot | — | — |
| (2) | Langlet | — | Perot |
| (3) | — | Perot | Langlet |
| (4) | Perot | Langlet | — |
| (5) | Langlet | — | — |

Each observer made eight observations with reversals of the photometer; and the mean of all these readings has been taken for the calculation. Between each series, the Carcel lamp was emptied and fresh oil put in and the wick changed; the pentane was changed in the Vernon-Harcourt lamp every twenty-four hours; the Hefner lamp only was re-lighted just as it was for each test. The aqueous vapour present in the air was determined by means of a psychrometer; and it did not vary appreciably in the course of a test. The content of carbonic acid was found to be very low—about 2·4 grammes per cubic metre*—which involves insignificant correction. The great size of the photometer-room —15,400 cubic feet—was doubtless the cause of the constancy of composition of the air during a series of observations.

*Apparatus.*—Two Carcel lamps were used. They had been found to be identical, and also similar to those of the Central Electricity Laboratory and the Municipal Laboratory of the City of Paris. The precautions mentioned in the instructions of MM. Dumas and Regnault have been taken. The oil and wicks were obtained from the maker of the lamp. The Hefner lamp was brought from M. Violle's laboratory at the Academy; two samples of amyl-acetate known to be good were used. The Vernon Harcourt lamp, which had a certificate from the National Physical Laboratory, had been sent by M. Vautier; the pentane was brought from Messrs. Simmance and Abady.

The two photometers were both of the Lummer-Brodhun pattern; one constructed by Pellin is a concentric disc apparatus, the other from the house of Hartmann and Braun is a contrast apparatus. The formulæ for corrections used were those of Herr Liebenthal for the Hefner, and that of Mr. Paterson for the Vernon Harcourt lamp. The first reduced to 8·8 litres of aqueous vapour; the second to 10 litres. In the following table, the mean results of five series, comprising some 320 measurements, are given. The small letters show the value of the ratio before the corrections for aqueous vapour have been applied. The latter have considerable importance, as the tension of aqueous vapour was high.

| Ratio | $\frac{v}{c}$ | $\frac{h}{c}$ | $\frac{h}{v}$ | $\frac{v}{c} \times \frac{h}{v}$ | Litres of aqueous vapour. |
|---|---|---|---|---|---|
| | 1·000 | 0·0937 | 0·0909 | 0·0909 | 17·2 |
| Ratio | $\frac{V}{C}$ | $\frac{H}{C}$ | $\frac{H}{V}$ | $\frac{V}{C} \times \frac{H}{V}$ | |
| | 1·053 | 0·0988 | 0·0910 | 0·0958 | |

Examination of these figures calls for some comments. If the figures in the first table are compared with those generally accepted, there is good agreement; but this is not the case with the figures in the second table. These measurements, however,

*This is equivalent to about 13 volumes of carbonic acid per 10,000 volumes of air, and can scarcely be rightly spoken of as very low.—Ed. J. G. L.

have been made when the humidity was very high; and it seems that the conclusion may be deduced from this fact that the Carcel lamp has a co-efficient of correction analogous to those of the two other standards, which are quite close to one another. Until the co-efficient of correction of the Carcel shall have been determined, it would appear that an analogous co-efficient to that of the other two ought to be applied—say, 0·006 (10 − $x$), in which $x$ is the number of litres of aqueous vapour contained in 1 cubic metre of dry air. In any case, its value is not independent of such a quantity. In the sequel, the uncorrected figures will be compared one with the other.

II.—Work Carried Out at the Central Electricity Laboratory (April, May, and June, 1906).

(1.) *Indirect Comparisons.*—The Central Electricity Laboratory has made a series of photometric comparisons of each of the three lamps—the Carcel, the Hefner, and the Vernon Harcourt—with one and the same incandescent lamp. The aim which the Committee have set themselves is to make measurements of intensity of light made with the different standards comparable. In order to bring the method employed for determining the ratios in question as close as possible to the application to be made of them in the sequel, it was decided to make measurements of the same intensity of light by means of the three standards.

For carrying out the tests, the regulation of an electric lamp, when the indispensable precautions are taken, is more exact and very much more convenient than that of a flame; and the use of a source of light for comparison which is independent of temperature and momentary atmospheric conditions, allows the constancy of the standard to be studied. The choice of a source of intermediate intensity offers certain advantages for the exactness of the measurements and the ease of carrying them out. The measurements were made by a contrast photometer on Lummer and Brodhun's system, made by Hartmann and Braun.

The incandescent electric lamp employed for the tests was a so-called "5-candle 110-volt," with flat filament, of horse-shoe shape. Its constancy had been proved. While having been alight for only a very short number of hours, it had been tested at different times over several years with a view to its use as a standard lamp. It was employed at a tension of 105 volts measured by means of a potentiometer, and its set was carefully preserved. The constancy of its luminous intensity was checked. Each observation comprised a series of ten readings; the photometer being reversed. The measurements were made as far as possible in duplicate, by observers who alternated photometry and the regulation and supervision of the lamps.

With sources of light of distinctly different colours, a systematic divergence has been established between the results of these two observers. In the actual case, on the other hand, the readings were always concordant—at least, every time the lamps were properly regulated. The tints of the standard are actually almost alike; and according to the results obtained, the most appreciable difference of colour (that between the Carcel and the Hefner) did not seem sufficient to cause any perceptible divergence between the two observers.

The work was begun in one photometer-room, in which the distance of the two sources under comparison was about 3 metres (9·84 feet), and it was continued in another room. The sources of light were differently placed, and the measurements were made under different conditions. No systematic error was disclosed thereby. In the second room the illumination on the photometer screen was about 2·5 *lux* when comparing the Carcel and the Vernon Harcourt with the incandescent lamp, and 1 *lux* in the measurements with the Hefner lamp.

*Carcel Lamps.*—The two lamps which had previously served for earlier work and had been compared with other lamps were used in this work. In the course of the work, measurements were made with another and new Carcel which was being tested, and account has been taken of these measurements in calculating the average of the results. The intensities of light of the Carcel lamp were referred to a consumption of 42 grammes of oil per hour, assuming that the intensity of light is proportional to the consumption. Twenty-nine series of measurements were made. The mean proportion of aqueous vapour was 10 litres per cubic metre of dry air, and the temperature 16° C. The incandescent electric lamp being given the symbol S′, it was found that—

Lamp S′ = 0·421 Carcel.

*Hefner Lamp.*—The incandescent electric lamp was compared with three Hefner standards. The one belonging to the Central Electricity Laboratory, made by Hartmann and Braun had been verified in 1906 by the Physical-Technical Institute at Charlottenburg. The other two lamps had likewise been verified in 1899 and 1904. The three lamps gave concordant results. Acetate of amyl which was known to be good was bought from two different vendors in Germany for use. Fourteen series of measurements were made. The mean proportion of aqueous vapour was 9·3 litres per cubic metre of dry air. The mean of the results obtained was—

Lamp S′ = 4·54 Hefners.

On correcting each result by Dr. Liebenthal's formula, so as to reduce the intensity of the light of the Hefner lamp to its normal value, corresponding with a proportion of 8·8 litres of aqueous vapour, it was found that—

Lamp S′ = 4·53 Hefners.

No correction was made for carbonic acid, as the photometer-room, of about 7060 cubic feet capacity, was freely ventilated about every twenty minutes.

*Vernon Harcourt Lamp.*—The lamp used in the tests had been bought in 1905. It was constructed by Messrs. Alex. Wright and Co., and was guaranteed to be in conformity with the prescriptions published by the Metropolitan Gas Referees. The pentane for the tests was bought in England of two different dealers. The mean of the results of twelve series of measurements made with a mean proportion of 10 litres of aqueous vapour per cubic metre, which corresponds with the normal for the standard, was—

Lamp S′ = 0·421 Vernon Harcourt.

From these figures the ratios of the three standards may be deduced; and thus the following values are obtained for the results of the indirect comparisons—

| | | |
|---|---|---|
| Vernon Harcourt . . . . . | = | 1·000 Carcel. |
| Hefner . . . . . | = | 0·0929 ,, |
| ,, . . . . . | = | 0·0929 Vernon Harcourt. |

It ought to be pointed out that the results found for the pentane lamp are lower than those generally obtained. It has seemed that this fact might be ascribed to a modification of the pentane used, as the residue of the liquid in the saturator was not always thrown away after each test.

(2.) *Direct Comparisons.*—With the object of verifying the preceding results, and of being able to compare them with the tests made at the Academy of Arts and Trades, the standards of light have been directly compared one with another. The simultaneous regulation of the two flames makes the tests more troublesome to carry out, errors more difficult to avoid, and, in particular, is more objectionable in that it tends to limit the number of measurements. We did not think it necessary in these tests to make corrections on account of the humidity of the air; it is tacitly admitted that the influence of aqueous vapour is the same for the three flame standards.

There were six series of measurements of the standards in pairs. The endeavour was made, as far as possible, to put them under the same atmospheric conditions. The average results were—

| | | | Litres of Aqueous Vapour per Cubic Metre of Dry Air. |
|---|---|---|---|
| Vernon Harcourt | = | 0 997 Carcel. . . . . | 10·1 |
| Hefner | = | 0·0915 ,, . . . . . | 9·1 |
| ,, | = | 0·0950 Vernon Harcourt . . . | 11 9 |

On correcting the last result so as to refer the ratio to standard humidities of 10 litres and 8·8 litres, it gives—

Hefner = 0·0954 Vernon Harcourt.

III.—Check and Verification Measurements made Jointly by the Academy of Arts and Trades and Central Electricity Laboratory (June and July, 1906).

With the object of verifying the preceding figures, and to be sure that the two methods lead to the same results, verification tests were undertaken in June and July, 1906. They comprised two distinct parts, referring respectively to the two methods used as described below.

(1.) *Indirect Measurements.*—The standard Carcel, Hefner, and Vernon Harcourt lamps which had been used by the Academy of Arts and Trades were compared with the incandescent electric lamp which had been used for the measurements at the Central Electricity Laboratory. These tests were made at the Central Laboratory, and later in the photometer-room at the Academy. The values found for the Academy standards fall within the series of results found for the Laboratory lamps, without there being any certainly systematic error between the standards.

(2.) *Direct Measurements.*—Direct comparisons of the three standards were made at the Academy in July, 1906. In these tests the lamps were those which had been used for the first investigation in 1905, and had now to be verified separately. The mode of working was the same. A Lummer and Brodhun photometer, from the Central Electricity Laboratory, was fitted on one of the photometer benches, which thus became each equipped with a similar photometer. The four observers—MM. Perot and Langlet of the Academy, and MM. Laporte and Jouaust of the Central Electricity Laboratory—alternately made photometric readings and supervised the standards. The readings were made simultaneously on two photometers, while one observer watched the steadiness of the Hefner flame, and another took the consumption of oil of the Carcel lamp. The observers changed alternately, in order each to make three photometric comparisons. Ten measurements were made for each comparison. The following results are the means of three complete cycles of tests by four different observers:—

| | | |
|---|---|---|
| Vernon Harcourt . . . . | = | 1·03 Carcel. |
| Hefner . . . . . | = | 0·0925 ,, |
| ,, . . . . . | = | 0·0922 Vernon Harcourt. |

The average temperature was 20·5°C. (70·9° Fahr.), and there were 15 litres of aqueous vapour per cubic metre of dry air.

It seems quite reasonable to take the mean of the results obtained under analogous conditions for the direct comparisons of the standards one with the other. If certain tests *a priori* appear to carry more weight than others, they should be the last, in which the number of observers was sufficient to give good supervision to the standards. However that may be, taking the

mean of the three results obtained directly, the following figures are arrived at:—

| | $\frac{V}{C}$ | $\frac{H}{C}$ | $\frac{H}{V}$ |
|---|---|---|---|
| Academy, 1905 | 1·000 | 0·0937 | 0·0909 |
| Central Laboratory, 1906 | 0·997 | 0·0915 | 0·0950 |
| Verification, July, 1906 | 1·030 | 0·0925 | 0·0922 |
| Mean | 1·009 | 0·0926 | 0·0927 |

Assuming that the three standards have the same coefficient of variation with humidity—viz., 0·006 per litre of aqueous vapour per cubic metre of dry air—it can be calculated what the preceding ratios become for the normal conditions of the standards; that is to say, for 10 litres of aqueous vapour for the Carcel and Vernon Harcourt, and 8·8 litres for the Hefner:

| $\frac{V}{C}$ | $\frac{H}{C}$ | $\frac{H}{V}$ |
|---|---|---|
| 1·009 | 0·0932 | 0·0933 |

These mean results comprise, as has been shown, a sufficiently large number of tests made under various conditions (different laboratories, lamps, and observers), and they agree well enough with the ratios found by the indirect method, viz.—

| $\frac{V}{C}$ | $\frac{H}{C}$ | $\frac{H}{C}$ |
|---|---|---|
| 1·000 | 0·0929 | 0·0929 |

It seems, therefore, that these ratios apply to the lamps used at the Academy of Arts and Trades and at the Central Electricity Laboratory, which are according to the specifications.

The foregoing report is signed by MM. A. Perot and P. Janet, the respective Directors of the Testing Laboratory and the Electricity Laboratory, and is dated Oct. 8, 1906.

## SUPPLEMENTARY INVESTIGATION OF THE RELATION BETWEEN STANDARD FLAME LAMPS—CARCEL, HEFNER, & VERNON HARCOURT.

**[A communication by M. Laporte to the Meeting of the International Photometric Committee, July 18 to 20.]**

The Central Electricity Laboratory undertook a fresh series of investigations in order to verify the ratios found for the intensities of light of the Carcel, Hefner, and Vernon Harcourt lamps. After having compared the lamps available in Paris—viz., five Carcels, four Hefners, and two Vernon Harcourts—either directly or through the intermediary of an incandescent electric lamp, it seemed interesting to compare the intensity of light of the Carcel lamp as used in Paris at the Central Electricity Laboratory with the Vernon Harcourt lamp as used at the National Physical Laboratory in England, and the Hefner lamp of the Imperial Physical Technical Institute in Germany, as these Institutions guarantee the constancy of standards of light in those two countries.

Some incandescent electric lamps were investigated therefore at the Central Electricity Laboratory at Paris, and their intensity of light was compared with the Carcel lamp there. In order to expedite the comparisons, and to avoid multiplication of measurements, the lamps intended to be sent abroad were carefully compared with the incandescent lamp which had been, and is still, used in all tests of the Carcel lamp (lamp S[1]). The lamps were taken to England by MM. Laporte and Jouaust, and were tested at the National Physical Laboratory at Teddington by Mr. Paterson. The difference of potential and the intensity of the current were measured on the potentiometer, and the intensity of light was measured by the method employed at this laboratory by means of an incandescent electric lamp which had been standardized by numerous comparisons with the British standard Vernon-Harcourt lamp. Fresh measurements were made in Paris on the return from England; and the lamps were then sent to Germany. They were tested at the Imperial Physico-Technical Institute at Charlottenburg by Dr. Liebenthal. The lamps were tested in the ordinary way followed at this laboratory, by comparison with standard lamps (? electric) of which the intensity of light was determined by measurements with the Hefner lamp.

A small difference exists between the Central Electricity Laboratory and the Imperial Physico-Technical Institute as to the unit of electromotive force, owing to the legal value of the Latimer-Clark standard cell (1·434 volts in France against 1·4328 volts in Germany). Account was taken of this difference in the tension at the terminals of the lamps; they were tested at the tension of 99·52 German volts, corresponding with 99·6 volts. An analogous correction has to be made on the intensity of the current, as the potentiometer is regulated by means of a standard cell. Below are given the results communicated by the Physico-Technical Institute. It has not been thought necessary to correct them for a difference depending on a decimal which is not given by this institution. The lamps were again tested photometrically on their return to the Central Electricity Laboratory. One of them had been broken in the course of the tests. Another gave results varying from day to day; and these have not been included in the appended table. For the sake of simplification, the average values obtained at the Central Electricity Laboratory are given.

| Lamp. | National Physical Laboratory. | | | Imperial Physico-Technical Institute. | | | Central Electricity Laboratory. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Volts. | Ampère. | Candle | Volts. | Ampère. | Hefner | Volts. | Ampère. | Carcel. |
| AL | 99·6 | 0·2667 | 7·38 | 99·52 | 0·266 | 7·98 | 99·6 | 0·267 | 0·75 |
| BL | ,, | 0·2824 | 8·99 | ,, | — | — | ,, | 0·2825 | 0·92 |
| CL | ,, | 0·26945 | 8·08 | ,, | 0·269 | 8·86 | ,, | 0·270 | 0·825 |
| DL | ,, | 0·2651 | 7·87 | ,, | 0·265 | 8·78 | ,, | 0·2655 | 0·82 |
| EL | ,, | 0·2728 | 8·35 | ,, | 0·272 | 9·04 | Variable | | |
| AC | ,, | 0·1847 | 3·91 | ,, | 0·184 | 4·35 | 99·6 | 0·185 | 0·405 |

From the foregoing results the following values for the ratios between the three flame standards used at the different laboratories can be deduced:—

*Ratio of the Standards.*

| Lamp. | Hefner. Carcel. | Vernon Harcourt. Carcel. | Hefner. Vernon Harcourt. |
|---|---|---|---|
| AL | 0·094 | 1·016 | 0·0925 |
| BL | — | 1·023 | — |
| CL | 0·0932 | 1·020 | 0·0912 |
| DL | 0·0934 | 1·041 | 0·0896 |
| EL | — | — | — |
| AC | 0·0932 | 1·035 | 0·0899 |
| Means | 0·0934 | 1·027 | 0·0908 |
| [Reciprocals | 10·701 | 0·9737 | 11·013] |

## EXAMINATION OF RESULTS OBTAINED FOR RATIOS BETWEEN THREE STANDARDS—CARCEL, HEFNER, & VERNON HARCOURT.

**[A Communication by M. Laporte to the Meeting of the International Photometric Committee, July 18 to 20.]**

At the last meeting of the International Photometric Committee at Zürich in 1903, Dr. Bunte, after reviewing the earlier work on this question, came to the conclusion that the following were the most probable values:—

Vernon Harcourt . . . . . = 11·4 Hefners*
Carcel . . . . . = 10·9 ,,

The work done in Germany at the Imperial Physico-Technical Institute by Dr. Liebenthal gave as a result of the comparison of the Carcel with the Hefner the ratio: Carcel = 10·8 Hefners. The Hefner is here referred to its normal atmospheric conditions—viz., 8·8 litres of aqueous vapour per cubic metre of dry air.†

Dr. Liebenthal made no correction on the intensity of the light of the Carcel lamp; but he ascertained by direct tests that the ratio $\frac{\text{Carcel}}{\text{Hefner}}$ varies little with atmospheric conditions, and that consequently the correction to be made to the intensity of light of the Carcel was close to that for the Hefner. Under these circumstances, it is tacitly admitted that, in the previous ratio, the Carcel was under the same atmospheric conditions as the Hefner lamp, or that the humidity of the air was 8·8 litres. Correcting the intensity of light of the Carcel lamp to correspond with the atmospheric condition which is taken as the mean in France—*i.e.*, to 10 litres of aqueous vapour per cubic metre of dry air—by use of the co-efficient (0·006) of correction which is applied to the Hefner and Vernon Harcourt lamps, the foregoing ratio becomes

Carcel . . . . . = 10·72 Hefners.

[Some tests made in 1906 and 1907 at the Central Electricity Laboratory under varied and many atmospheric conditions on the question of the correction for the Carcel lamp indicated that the formula for the correction was a complicated one, and that temperature seemed to come into play. The intensity of the light increased with the temperature. Between 15° and 20° C., however, the co-efficient of variation approached the value stated for the other standards.] The ratio found for the Vernon Harcourt lamp was

Vernon Harcourt . . . . . = 10·9 Hefners.

The pentane lamp was under the normal English atmospheric conditions—viz., 10 litres of aqueous vapour per cubic metre of dry air, with 8·8 litres for the Hefner lamp.‡

The results of the investigation made in England by Mr. Paterson at the National Physical Laboratory were as follows:—

Hefner . . . . . = 0·0914 Vernon Harcourt.
Vernon Harcourt . . . = 10·95 Hefners.§

The pentane was taken as burning under the normal 10 litres, and the Hefner lamp under only 8·8 litres of aqueous vapour per cubic metre of dry air. For the Carcel lamp, the ratio found was—

Carcel. . . . . = 0·9825 Vernon Harcourt.

The tests undertaken in France by M. Perot at the Testing Laboratory, and by MM. Laporte and Jouaust at the Central Electricity Laboratory, including both direct comparisons of the lamps with one another and comparisons made through the inter-

* See "JOURNAL," Vol. LXXXII., p. 957. † *Ibid.*, Vol. XCV., p. 102.
‡ *Ibid.*, Vol. XCV., p. 102. § *Ibid.*, Vol. XCVII., p. 282.

mediary of an incandescent electric lamp, and with corrections applied to refer each lamp to its standard atmospheric conditions, have given the following average results:—

Hefner . . . . . = 0·093 Carcel.
Vernon Harcourt . . . . . = 1·005 ,,
Hefner . . . . . = 0·093 Vernon Harcourt.

Other interesting comparisons of importance have been made by certain physicists who have travelled successively to Germany, England, and France, taking with them the same incandescent electric lamps. By comparing the values obtained, the ratios of the intensities of light of the standards of each country can be calculated under the identical conditions under which they are used. Mr. Sharp, of the Electrical Testing Laboratories of New York, thus obtained, in 1903, the following results for the mean of the intensities of the light of his lamps:—

National Physical Laboratory at London 16·89 candles.
Central Electricity Laboratory at Paris . 16·2 bougies decimales, or 1·685 Carcel.
Imperial Physico-Technical Institute at Charlottenburg . . . . . 18·12 Hefners.

From these figures, the following ratios are deduced:—

Vernon Harcourt . . . . . = 0·998 Carcel.
,, ,, . . . . . = 10·72 Hefners.
Hefner . . . . . = 0·093 Carcel.
,, . . . . . = 0·0933 Vernon Harcourt.

Mr. Hyde, Assistant in Physics to the Standards Office at Washington, in 1906 made the same trip; and he has recently published the results of his tests. The ratios obtained by him from the means of the values of ten lamps are as follows:—

Vernon Harcourt . . . . . = 11·19 Hefners.
Carcel . . . . . = 10·73 ,,
Vernon Harcourt . . . . . = 1·043 Carcel.

Finally, in 1907, the Central Laboratory of Electricity sent MM. Laporte and Jouaust to Teddington and Charlottenburg with incandescent electric lamps. The results of their series of measurements were—

Hefner . . . . . = 0·0934 Carcel
Vernon Harcourt . . . . . = 1·027 ,,
Whence Hefner . . . . . = 0·0908 Vernon Harcourt.

In order to facilitate comparison of the results of the different tests, they are given with calculated reciprocals in the following table. To distinguish between the figures found at the various institutions and the results which are calculated reciprocals, the latter are put in italics.

*Values of the Intensity of the Light of each Lamp in Terms of the other two.*

| Lamp. | Researches. | Hefners. | Vernon Harcourt. |
|---|---|---|---|
| Carcel | 1 | 10·72 | *0·984* |
| | 2 | *10·73* | 0·982 |
| | 3 | *10·75* | *0·995* |
| | 4 | *10·75* | *1·002* |
| | 5 | 10·73 | *0·958* |
| | 6 | *10·70* | *0·973* |
| | | Carcel. | Vernon Harcourt. |
| Hefner | 1 | *0·0933* | *0·0918* |
| | 2 | *0·0930* | 0·0914 |
| | 3 | 0·093 | 0·093 |
| | 4 | 0·0930 | 0·0933 |
| | 5 | *0·0932* | *0·0894* |
| | 6 | 0·0934 | 0·0908 |
| | | Carcel. | Hefners. |
| Vernon Harcourt | 1 | *1·016* | 10·9 |
| | 2 | 1·018 | 10·95 |
| | 3 | 1·005 | *10·75* |
| | 4 | 0·998 | *10·72* |
| | 5 | 1·043 | *11·19* |
| | 6 | 1·027 | *11·01* |

The researches referred to by the numbers are: (1) The German, (2) the English, (3) the French, (4) Mr. Sharp's in 1903, (5) Mr. Hyde's in 1906, and (6) those of MM. Laporte and Jouaust in 1907.

A study of this table shows that the ratio between the Carcel and the Hefner lamps is concordant; and its determination seems to suffice. For the ratios of the Vernon Harcourt lamp to the Carcel and Hefner lamps, the results of the three German, English, and French investigations differ by less than 2 per cent.; but the errors obtained in the comparisons of the lamps carried from one laboratory to another reach 4 per cent. It is difficult to say whether these differences are due to accidental errors of the measurements, or to systematic differences between the different specimens of the standards, or to different estimates of the atmospheric conditions. Under these circumstances, it seems quite enough to express the ratios of the units by two significant figures. However, as by suppressing the decimals errors might be increased when the reciprocal or the ratio of two co-efficients is taken, it is thought that it will be useful to fix at the same time the values to be adopted for the ratios and their reciprocals. Accordingly, one or other of the co-efficients in the appended table should be taken:—

*Proposed Values for the Ratios of the Three Lamps. Value of the Intensity of the Light of One Lamp in terms of the Others.*

1 Carcel = 10·75 Hefners = 0·98 Vernon Harcourt.
1 Hefner = 0·093 Carcel = 0·0915 ,, ,,
1 Vernon Harcourt = 1·02 ,, = 10·95 Hefners.

It seems that the recent work of the different laboratories has now quite established the specifications of their respective standards; and, consequently, the values of the ratios given above may be regarded as within 1 per cent. more or less.

## TRANSMISSION OF GAS AT HIGH PRESSURE.

At the last annual meeting of the Iowa District Gas Association, Mr. R. H. Lawlor, of Waterloo (Ia.), submitted a paper giving particulars of a high-pressure gas system carried out by him. He explained that the matter came before them after an explosion in their purifier-house at Cedar Falls, which resulted in the destruction of the plant. It was then necessary to rebuild there or pump the gas from the plant at Waterloo; and Mr. Lawlor gave the reasons which led them to adopt the latter course.

He said: The most important reason for adopting the high-pressure system was the ability to concentrate the manufacture of gas for the two cities in the one plant at Waterloo—thereby reducing not only the cost of production, but also the maintenance charge, which in small plants is always relatively high. Then, again, we were able to instal a booster system from the high-pressure line to supplement the pressure in the west side system of mains, which during peak-hours had become inadequate to the increased and increasing demand. Further than this, we were in a position to use residence regulators, and secure a number of suburban and rural customers who were otherwise outside our territory.

Both Waterloo and Cedar Falls are situated on the Cedar River; the stream dividing the former into two parts in population at about the ratio of 3 : 5—the larger number being on the east side, which is also the location of our plant. Cedar Falls is about eight miles distant, and on the west bank of the Cedar. In determining the location of the pipe-line, we followed the street-car line as closely as the public highways would permit—knowing, of course, that the residential growth of the two cities would be along that route.

At the Waterloo plant we installed a cross-compound automatic Ingersoll-Rand compressor, with a capacity of 25,000 cubic feet per hour, running at 180 revolutions a minute. Just outside the compressor-room, we set a baffle-plate drum with drip to condense and remove the moisture from the gas. The line is of 4-inch steel pipe, with extra heavy malleable fittings and with long expansion joints of the Dresser pattern every 500 feet.

In crossing the river, we used extra heavy steel pipe connected all through with the Dresser joints. The river crossing was laid at the lowest stage of water when it was possible to excavate a trench with pick and shovel, with drain as far as possible towards the farther side of the river, where a small drip was put in. About 200 feet from the river, we installed another baffle-plate drum, with drip for the further removal of condensation. The gas-main was laid at a depth of about 3 feet, though for experiment about two miles was covered to a depth of only about 18 inches. With this shallow pipe we experienced no difficulty last winter, nor do we believe there can be any under ordinary conditions, if proper provision is made for condensation and its removal within the first mile.

The only trouble with the high-pressure system so far experienced was the result of an oversight in that we neglected to trap the outlet of the baffle-plate drum at the plant, which allowed some of the condensation water to pass out into the line and freeze. When the warmer weather last spring set in, the ice loosened in the 4-inch line, and was driven ahead to the river crossing about 1000 feet, where it clogged up on one of the bends. Opening the end of this fitting enabled us to blow out the accumulation of ice; and it has since remained clear.

To rectify this construction, and avoid future trouble of like kind, we put in a trap beyond the baffle-plate drum that is raised 5 feet above the drum, then down again to the main. To supplement the pressure on the old west side distribution system, we ran a line of 8-inch cast pipe connecting with the various street lines which it crossed, and joined up this 8-inch line with the high-pressure line, using a Chaplin-Fulton sensitive governor for passing the gas from the high to the low pressure system. This governor is installed in an 8 ft. by 10 ft. brick pit, with two manhole covers in the top. The governor is bye-passed with a 2-inch pipe, so that if we have trouble with it at any time we can regulate the pressure with a gate-valve while repairing the governor.

To relieve excessive pressure, we put in a seal of 2-inch pipe on the low-pressure side of the governor—using for the purpose an iron box filled with zero oil, with a 2-inch pipe running down into the oil 8 inches, so that as soon as we get more than 6½ inches of pressure on the low side, the seal will blow.

For the Cedar Falls distribution we still use the pressure of the 50,000-feet holder, regulated by a Connelly automatic governor; the holder being filled directly from the high-pressure line, pumping over the supply twice a day, and keeping off the hours of greatest demand. We are well pleased with the system employed, and believe that it is doing what we hoped in effecting a material decrease in the cost of manufacture and maintenance.

**Manchester District Institution of Gas Engineers.**—We learn from the Hon. Secretary (Mr. H. Kendrick, of Stretford) that it has been decided to hold the excursion meeting of the Institution at Worksop and the Dukeries on Saturday, the 31st prox.

# NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

### Annual Meeting in Glasgow.

[From our own Correspondent.]

Judged of by bulk, more political than scientific, yet, from a scientific point of view, of high practical value, is not an inapt description of the annual meeting of the North British Association of Gas Managers, which was held in Glasgow last Thursday. In both fields of consideration there were important subjects to discuss, which may be taken as the reason for the large turn-out of members. Besides the members, there was a notable feature in the composition of the meeting in the welcome presence of so many representatives from England. Not only was the President of the Institution of Gas Engineers (Mr. W. Doig Gibb) present—himself a Scotchman and a member of the North of England Association—but there were also representatives from the Manchester District Institution and the Eastern Counties Association—Messrs. W. Prince and R. G. Shadbolt. The happy "accident" by which they chanced to put in an appearance, it may be taken for granted, was not that Scotland is this year an unwonted attraction for tourists, nor the technical fare offered, but may be found chiefly in the knowledge that the question of affiliation with the Institution was to be once more discussed, and in the personal regard which his southern brethren have for the North British President—Mr. Lawrence Hislop, of Uddingston. Last year, only apologies for absence were received from representatives of Gas Associations in England; and the prospect was that of a gulf in formation between the bodies south and north of the Tweed. This year—largely owing to Mr. Hislop's exertions—the ranks have been closed, and solidarity among the conductors of the gas industry secured.

This remark brings up the question of affiliation, which was the most important of the non-technical subjects before the meeting. There was only a slight show of resistance to the proposal of the Committee (introduced by the President) that the Association should affiliate. Arguments were used against affiliation which have been used before and, in the view of most people, explained away. But on this occasion all that the opponents moved for was delay. The objection was not so much to affiliation, as to the way in which it was being promoted. They were willing to join, but had not been asked in the proper way. What was wanted was that the Institution should present their suit to the North British Association, as the oldest of the constitutional Gas Associations, and ask them, as a favour, to come into the tabernacle. The situation was really this, that the Institution had asked them to come in, and the invitation had been declined. There was no fresh application from the Institution, as an Institution, but the President of the Institution was present (it is true without a mandate from his Council), and he was able to give assurances as to the continuance of the Association in their present position, should they affiliate. The Association, therefore, by an overwhelming majority, decided on affiliation; and thus the question is ended, it is to be hoped happily for all parties. Last year comparison was made in the "Journal" between the Union between Scotland and England; the comparison is now complete. When the two Crowns were united, Scotland gave a thing to England; now when the Union in the Gas Kingdom has been effected, Scotland gives the first President to the united body. One can only repeat the hope that the present union may prove as beneficial as did the National one.

Before the affiliation question came up, there was a sort of foretaste of it, in the proposal to change the name of the Association from "North British" to "Scottish," and to put "Engineers" as well as "Managers" into the title. The only reason given for the change was the sentimental one of proclaiming, on the very face of everything the Association might do, that it was a national body, and thereby preventing its being regarded by anyone as a District Association. Probably were the Association being formed now, the word would be "Scottish;" but without more powerful reasons for the change than those put forward, it is as well to let the old name, by which it has been known now for forty-five years, remain; and this the Association, by a large majority, decided to do.

Another of the "political" subjects before the meeting was the formation of a Commercial Section. This was the pet proposal of the President; and he carried it unanimously. The section is to be self-supporting, and to conduct its business in private, but to report annually to the Association, who will, of course, have the power, should it prove useless, or harmful, to bring it to an end. It will be a difficult matter to work, and require careful handling. The underlying principle of such a scheme is, of course, that the strong man is to come to the help of the weak, in the disposal of his bye-products.

Mr. Hislop made an excellent President—having not a great deal to say, but saying what he had to say to the point. His address was of the work-a-day type, dealing with numerous questions which are at present engaging the attention of gas managers, and dismissing them with words of advice which, coming from a gentleman of so strongly practical a mind, are worthy of more than passing consideration. The meeting he presided over was of more than ordinary interest, both from the number of members attending, and the importance of the subjects discussed. He is to be congratulated upon his being President in a year which will be an outstanding one in the history of the Association, and also upon the way in which he carried through the business, which he himself described as delicate.

Of the technical subjects before the meeting, the members treated that of naphthalene extraction as the leading one. It was introduced by Mr. J. D. Smith, of Stirling, in a paper in which he detailed the success he has had in getting rid of the inconvenience, annoyance, and expense, by using Everitt's tar-extractor. Naphthalene is a new enemy to the gas manager of Scotland; and it was, therefore, not to be wondered at that, in the long discussion which followed the paper, the views expressed by the Scotsmen should have been tinged with proverbial Scotch caution. It was left to the friends from England to speak with confidence derived from experience. This they did; their views being received with appreciation, to be followed, doubtless, with profit to gas managers in the North.

The paper by Mr. Alex. Yuill, of Dundee, on the "Practical Management of Gas-Works," was, as its title expressed, truly a practical one. The crown of the paper was his remarks about the advantage of using a retort-house governor. On this point, he received the applause of the meeting when he described, by illustration, the benefits of the low seal. There was a disposition to treat the governor as something new; but Mr. J. Hepworth, of Edinburgh, dispelled any such notion, by the statement that his firm have supplied them, chiefly to London Gas Companies, for the last twenty years, during all of which time they have done excellent work.

Mr. J. Campbell, of Polmont, gave a most interesting, and, as it was characterized, unique paper, upon his own experiences in introducing gas to a district not before being supplied. Having a fresh field to work upon, he encountered difficulties which do not come in the way of those in charge of established businesses. But, as Mr. Alex. Wilson, of Glasgow, pointed out, the methods followed by Mr. Campbell were instructive to all. There is new ground to be broken in every area of supply; and it cannot fail to be instructive to learn what methods have been successful in working a district which has never been occupied before.

The intimation was made, towards the close of the meeting, that the Secretary and Treasurer—Mr. R. S. Carlow—had, on account of ill-health, tendered his resignation of office, as from the end of the financial year in June next, by which time Mr. Carlow will have completed twenty-one years of official connection with the Association. The prospective loss of so trusty an official came upon the members with surprise. There cannot but be regret that so long a career of usefulness should be about to close, and the regret is all the greater on account of the cause. The Association will miss Mr. Carlow, who has, all through his term of office, been most scrupulous in looking after the interests confided to him; and he has conducted himself in so genial a fashion that it will puzzle everyone to recall any instance of even a shade of anything in his bearing towards the members that was not, in all respects, helpful.

The Association meet in Edinburgh next year, with Mr. W. Blair, of Helensburgh, as President.

## GENERAL REPORT.

The Forty-Sixth Annual General Meeting of the North British Association of Gas Managers, held in the hall of the Glasgow Philosophical Society, Bath Street, Glasgow, last Thursday, was exceedingly well attended; great interest being shown in a gathering at which, besides the technical work, there were a number of questions relating to the general policy of the Association put down for consideration.

### Greetings and Apologies.

Mr. L. Hislop (Uddingston), the President, on taking the chair, expressed his pleasure at seeing so large a party. He said the meeting had been called for an early hour, as they had a considerable amount of business to carry through. They were very pleased to have with them Mr. W. Doig Gibb, the President of the Institution of Gas Engineers. They had also Mr. W. Prince (the President of the Manchester District Institution of Gas Engineers), and other leaders of the Institution. They had some letters of apology. Mr. Charles Hunt, the Past-President of the Institution, regretted very much that he was unable to be present, owing to business engagements; and Mr. Francis T. Cotton, of Dublin, and, among their own members, Mr. W. R. Herring, of Edinburgh, and Mr. George R. Hislop, of Paisley, and some others, wrote expressing regret at their unavoidable absence.

### Report of the Committee.

The Secretary (Mr. R. S. Carlow, of Perth) read the report of the Committee. It was stated therein that the Benevolent Fund had been drawn upon during the year to the extent of £20;

three deserving cases having been dealt with by the Committee. There had been five matters of importance to which the Committee had had to give a good deal of attention. The first was the alteration of the name of the Association. The Committee gave this matter much consideration; and, after long discussion, it was unanimously resolved to take no further action in the matter. The second subject was the "M'Gilchrist Memorial." After discussion, the Committee remitted to Mr. Yuill, of Dundee, to bring the suggestion that a M'Gilchrist Memorial Fund be inaugurated before the Informal Meeting of Gas Managers, and to ask those present at it to take over the responsibility (seeing that Mr. M'Gilchrist was so closely associated with that meeting), and appoint a Committee to carry to a successful termination any arrangements which might be made. The Committee were glad to learn that Mr. Yuill had been successful in getting the Informal Meeting to take over the responsibility and to appoint a Committee, as suggested; and that they had taken action in the matter by sending out a circular asking for subscriptions. The third matter was the publication of Mr. Young's papers. The Secretary laid before the Committee a letter he had received from Mr. Alex. Bell, of Dalkeith, on this subject; and, after some discussion, the Secretary was instructed to write to Mr. Bell and ask him for some more information. The Committee wanted to know what the total cost would be for (say) 300 copies, which must include Dr. Daniell's fee, and making the book complete and ready for sending out to members and others who desired to have it. The Secretary had written to Mr. Bell, but as yet had not received a reply. The fourth subject related to the formation of a Commercial Section. After the President had read letters he had received from Mr. Meunier, of Stockport, and others, the Committee resolved to form a Commercial Section in connection with the Association, and to issue circulars to the ordinary members, asking them to join. The Committee understood that this circular was in the hands of all the ordinary members. The fifth subject was that of affiliation. The Committee decided to re-open this question with the Institution of Gas Engineers, by sending out a circular to all the members of the Association, pointing out to them the benefits to be derived by the gas industry in general, and by the Association in particular, from affiliation, so that the members could give their decision for or against it.

### Roll of the Association.

The membership of the Association, including the additions made at the meeting, numbered 232—the same as a year ago.

### New Members.

The following were admitted to the Association:—

*Ordinary Members.*—James Campbell, Polmont; James Dickson, Kelty; G. R. Hislop, Paisley; J. D. Keillor, Lochgelly; S. B. Langlands, Glasgow; W. M'Call, Iquique, Chili; James M'Leod, Kirkintilloch; W. Ritchie, Peterhead; W. J. Smith, Carlisle; W. Wilson, Falkirk.

*Extraordinary Members.*—J. W. Broadhead, Elland; C. Ferns, Nottingham; E. J. King, Elland; T. K. Leckie, Coatbridge; J. M'Farlane, Cardross; E. M. Stewart, Bonnybridge; R. S. Workman, Saltcoats.

The President remarked that the report of the Committee was very satisfactory, as it showed that their membership was not decreasing. It was a great satisfaction to them that Mr. George R. Hislop, of Paisley, had again consented to join their ranks.

Mr. J. M'Donald (Denny) moved, and Mr. A. M'Leod (Dawsholm) seconded, the adoption of the report; and the motion was agreed to.

### Name of the Association.

Mr. J. W. Carmichael (Barrhead), speaking on the subject of the name of the Association, which arose upon the report, said he thought it had received scant attention from the Committee. There was some need for the name being changed. The objectionable words that were applied to the Association had not been obliterated. He wanted the name changed, so that they would not be mistaken for anything other than a National Association. By putting "Scottish" in the front, they proclaimed to all that they were a National Association. It was not a narrowing of the borders of the Association, but the reverse, as he was quite certain they would have members joining from all parts of the world. The Junior Association did not put "North British" into their name, but "Scottish." He proposed that the name be changed to the "Scottish Gas Engineers' and Managers' Association," or the "Scottish Association of Gas Engineers and Managers."

Mr. T. Lighbody (Renfrew) seconded. He could not understand why the Committee had decided to throw the subject overboard, seeing that the general meeting last year ordered it to be brought up this year.

Mr. A. Napier (Crieff) moved, and Mr. J. Napier Myers (Saltcoats) seconded, that the name of the Association remain as at present.

A vote was taken by show of hands, with the result that the amendment was carried by 26 to 12.

### Formation of a Commercial Section.

The President said that all the ordinary members had had a circular sent to them; and, so far, 52 replies had been received in favour of, and 1 against, the proposal to form a Commercial Section. This showed that there was a demand for a section on lines somewhat similar to those which the circular indicated. He moved therefore that a Commercial Section be formed under the auspices of the Association. The expenses of working would, of course, be borne by the section itself, which would merely have the name of the Association, and would report to the Association annually as to its working.

Mr. J. D. Smith (Stirling) seconded.

Mr. J. Napier Myers, though not prepared to move an amendment, strongly disapproved of the proposal. He desired to express his sympathy with those who wished to form a Commercial Section. It showed that there was some energy among their members—that they had some degree of pushfulness in the Association, though it was 45 years of age. But the fact that they had continued for 45 years to discuss (in a somewhat academical spirit) technical matters, showed that the Association was filling a very much felt want among them. He was opposed to the introduction of the commercial spirit into the Association. It seemed to him that it savoured somewhat of the trusts and the syndicates, and those evil monsters which they had records of from America. He did not believe a meeting of gas managers in Glasgow, say once a month, would be at all helpful to them. He was disposed to think it would be rather a drawback. The cost of attending the meetings would have to be borne by the individual members; and it would be only those within a radius of (say) 100 miles of Glasgow who could possibly attend. Even to them, the cost would be considerable; and he would not be disposed to bear that outlay himself, neither could he propose it to his Company. The benefits to be derived were too intangible, it appeared to him, to lay before any Committee with a request that they should bear the cost. He would rather stick to the lines originally laid down as the objects of the Association.

There being no amendment, the motion of the President was unanimously adopted.

### Auditor's Report.

Mr. R. B. Main (Glasgow), in submitting the Auditor's report, said he was pleased that the funds of the Association continued in a very satisfactory state. The General Fund had increased by £9 2s. 6d.; while the Benevolent Fund, notwithstanding the fact that the Committee had paid out £20, showed an increase of £11 10s. 6d. The Research Fund had had an extraordinary expenditure of £8 2s. 4d. The total funds were: Benevolent Fund, £384; Research Fund, £162; and at the credit of the Excursion Fund, £30—altogether £576.

The report having been adopted,

Mr. A. Yuill (Dundee) proposed that they give Mr. Main their thanks for the labour and trouble to which he had put himself during the past year, in going over the books.

Mr. Main returned thanks.

### Question of Affiliation.

The President, referring to the question of affiliation, said he presumed they had all had a copy of the circular sent out by the Committee; and it would be needless to read it. He would therefore move that the Association be affiliated with the Institution of Gas Engineers.

Mr. D. Robertson (Dunoon) asked how many members of the Committee were present when it was resolved to issue the circular; and if the Committee had before them any proposals from the Institution.

The President replied that the question of affiliation was before two or three meetings of the Committee, at which all the acting members were present. They had really no further particulars from the Institution, with the exception that most of the information in the circular regarding the advantages to be derived from affiliation had been obtained direct from the Secretary of the Institution.

Mr. W. B. M'Lusky (Perth) seconded the President's motion.

Mr. A. Yuill, in supporting it, said he considered it would be of advantage to the Association to affiliate. They were there to conserve, not only the interests of the Association, but those of the gas industry generally. Various moves were being made by corporations and local authorities before the Board of Trade, such as to have the standard of light determined. The Board of Trade would naturally ask the co-operation of the Institution of Gas Engineers. If the Association were connected with the Institution, they would derive benefit in such a matter; and there might be others coming up from time to time.

Mr. J. Napier Myers moved that decision be deferred for a year. His sympathy was somewhat with the desire to affiliate; but there was a note in the circular to the effect that the cost to the Association would be five guineas per annum, the tone of which he did not like. This matter of bargaining should not come into the question at all. Though the price was a very small one to give solidarity to their voice in legislative matters, what offended him was the bringing of it up now. Two years ago the question was before them; and they decided by a large majority that they would not affiliate. The subject had been brought up twice, and he though it was too short a time to force it upon the members again.

Mr. T. Lighbody, in seconding, remarked that the first question which appealed to him was, Could they afford to affiliate? Five guineas per annum was not a large sum; but it meant that they would require to increase their subscriptions. Some 17 per cent. only of the members of the Association were also members of the

Institution. Were they to increase their subscriptions to get a few more from the North British? The Institution were taking the whole credit of being able to lay subjects before the Board of Trade; but it was taking out of the hands of the owners of gas undertakings the interests they had in them—it was taking away from their employers their standing in the matter. In one part of the circular it was said that the Association would be in a better position to secure two or three representatives on the Council; but later on it was "our representative" only who was spoken of. They were apparently to have only one representative for the five guineas. In the letters which were received when he was a member of Committee, the Institution practically reserved the right to make the Association alter their constitution; and he thought the letter Mr. Carmichael read last year showed that the Institution cast envious eyes upon their Benevolent Fund.

Mr. A. NAPIER (Crieff) thought this raised a serious question. They must bear in mind that they were already affiliated and amalgamated with the West of Scotland Association; and they could not "play ducks and drakes" with the Benevolent Fund of the Association.

The PRESIDENT read a letter from the Secretary of the Institution, dated Nov. 18, 1903, in which it was stated: "Such affiliation . . . does not involve either change of name, dissolution, or any interference in the existing management of your Association." The letter Mr. Lighbody referred to as having been read last year was only an appeal to members of the Association to subscribe to the Institution Benevolent Fund. It had nothing to do with the Benevolent Fund of their own Association.

Mr. D. VASS (Airdrie), as a member of the Institution and a supporter of affiliation, wished to make it clear that it was voluntary contributions which were asked, and not a proportion of the annual contribution to be set aside for a Benevolent Fund. He tried to raise the question in the Institution of making it a compulsory subscription, but was told that it was impossible. He was in sympathy with affiliation, and thought the advantage of unity was sufficient to decide the matter.

Mr. J. W. NAPIER (Alloa) wished to associate himself most heartily with the desire for affiliation, and said that he would endeavour to clear away some of the misty atmosphere in which Mr. Lighbody appeared to dwell in connection with this question. A few months ago, previous to his address as President of the Informal Meeting, he was in communication with Mr. Walter T. Dunn, the Secretary of the Institution, with regard to some of the more outstanding features of the question of affiliation; and Mr. Dunn wrote to him, as one of the terms distinctly laid down, that "the name of each District Association shall be retained, and that the management and financial arrangements of them, respectively, remain under the control of each such Association." It was surely outside the subject altogether to say that their Benevolent Fund was in danger, or that the Association, as a constituted body, was likely to be lost, in any sense whatever. Then, if they affiliated, either side could, if desired, terminate the arrangement by giving six months' notice. Consequently they were not affiliating in any permanent way, but subject to reconsideration from time to time. In the minds of a considerable number of the members, there was a latent feeling that in affiliation there might be danger to members of the Association who were not members of the Institution. He raised this point with Mr. Dunn. He knew it was a thorny question; and he wished it cleared away. Mr. Dunn wrote: "In regard to some of the members of the North British Association not being eligible to join the Institution, I may say that the Eastern Counties Association, which is affiliated, has also in one of the classes of its membership gentlemen such as you refer to." Therefore it was perfectly clear that, as the Association was at present formed, there might be members, associates, and extraordinary members, who were not in the slightest degree to be tampered with.

Mr. J. W. CARMICHAEL supported the amendment. He could not help feeling that the advantages which were held out to them were purely suppositious. If any Bill came before Parliament, or any question before the Board of Trade, could they not as unitedly, and as loyally, give their support as if they were affiliated? Were gas directors and the members of corporations to be looked upon as ignorant men, who did not know their duties? A combined association could do good work in the matter of research, of which very little had been done in the past; and there was small prospect of much being done in the future. He did not know what to make of the selection of a representative. They were to pay five guineas, and for all that they were not to be allowed to choose their representative from any class except from the 17 per cent. who were members of the Institution. Was this right or fair? He did not think so. How many of their members would join the Institution because of there being no entrance fee? How many would be prepared to go to London, and spend £10 or £20 in keeping themselves there, and yet would not join because the paltry entrance fee stood in their way? Before any steps were taken, it was fair to the members of the Association that legal opinion be taken as to the powers of the Institution to alter the constitution of the Association or interfere with their funds. It would satisfy him, and he was sure a majority of the members, if legal opinion were secured to show that, whatever the intentions of the Institution were, they would not have the power to interfere with funds or alter the constitution. As business men, they ought to safeguard their funds. He must say he was not an out-and-out opponent of affiliation. He wanted to see it carried through on proper lines; and he opposed the motion simply because he thought the circular was misleading, and because it would bring harm to the Association. It seemed a little strange to him that the gentlemen who had taken charge of the proposal for a memorial to the late Mr. M'Gilchrist should, at the same time, trample under foot, as it were, his views upon the matter. Mr. M'Gilchrist said they had wasted time upon it, and that the repeated applications to join the Institution, when they could give them no benefit, seemed to him "absurd and idle." These words were from a man in close connection with the Institution. To go hat in hand and say to the Institution, "We have made a mistake in the past; open your door, and take us in," was surely humiliating.

Mr. T. WILSON (Coatbridge) considered that, in a word, they had nothing to lose by affiliation, but everything to gain.

Mr. A. MACKAY (Montrose), as one of the younger members of the Association, considered the class he belonged to would have the greatest benefit from affiliation. He became a member of the Institution this year; and a blush came to his cheek when he saw at the meetings representatives from all the world, except from Scotland. Really the Institution had great patience with Scotchmen, in continually asking them to join their ranks.

Mr. ALEX. WILSON (Glasgow) said it seemed to him the whole of this trouble started at the beginning, in the first letter which was sent to the Association describing them as a District Association. Had that letter been differently worded, there would have been none of this trouble at all. But the Council of the Institution, of which he happened to be a member at the present time, had expressed regret that the letter had been worded in this way, and made their *amende* in another letter. They might have accepted this in the spirit in which it was sent. A good deal of misunderstanding seemed to be in the minds of members with regard to the affiliation question. Even that morning, after all that had been said and written on the subject, they still had points raised which had been explained away over and over again. With regard to interference with the members or the constitution of the various Associations which were affiliated, there was no question whatever. He thought he was quite right in saying that no interference would take place with any of their rules or regulations, or with their funds. The other point mentioned by Mr. Napier, of Alloa, made it also quite clear that if they did not think it to their benefit to remain, they were entitled to retire after six months. This would be a sort of safety-valve, to let off any feeling that might arise. There was no question that the benefits to the Association would be very great. It would put them into line with all the other Associations in the country, and allow them to be heard where they ought to be heard—in the larger Institution. Why should the North British Association be merely a parochial institution? He thought the present was a most opportune time for bringing the question forward again. The President of the Institution, whom he was glad to see with them, was a Scotsman; and it would be a feather in his cap if he were to get the Scottish Association to join when he was President. The question of the number of representatives had been raised; and there was a little dubiety in the minds of several of the speakers with regard to this. The circular, perhaps, was not very clearly worded; but they would be entitled to send a member to represent the Association on the Council of the Institution, as a "district member." All the other Associations were affiliating; and there was no difficulty in their own doing it. The questions raised in the Institution dealt with general matters affecting the gas industry; and surely the gas engineer or manager was the best man to deal with such questions. What was meant by having several other members on the Council representing Scotland was, he thought, that if they were affiliated, a great many more of their members would join the Institution, and in this way they would have a better representation from Scotland, which would enable them to put others, if they wished, on to the Council. By putting their heads together, as they did in other districts, they could appoint ordinary members to the Council. At present there was not the same enthusiasm and not the same united action taken in Scotland with regard to the Institution that he had no doubt would be taken if they affiliated. It would be strange if, in future, they did not have a few members of the North British Association always near the head of the Institution, as they found Scotsmen at the head of everything else. Research work had just been mentioned. The Institution were going into this question very fully; and though they were not moving very rapidly, they were none the worse for that. They were moving in the most comprehensive way, and were dealing with matters which would be of interest to every gas association and to every gas company and corporation. Why should they not take their share in this work? He considered it would be a great pity if the Scottish Association were left out of the work; and this was what they certainly would be if they did not join with the Institution, and help them on with it. They would be left out in the cold for the sake of a small misunderstanding which took place at the beginning, and which had been cleared away. He certainly thought they should go on with the proposal to affiliate.

Mr. D. ROBERTSON (Dunoon) did not wish to say anything in the slightest degree against the Institution. He hoped the members of that body from England who were with them would not go away convinced that they had any antipathy to them as members of the Institution, or to the Institution as a whole. It was very hard, however, to get over the fact that, at the beginning, they were put down as a District Association; and it was very hard to convince some of them that they would not be classed

still as a District Association. It would have been better if the Institution had been able to lay something before them that day—if some new proposals had been submitted to them. They were going to vote on the old question of whether they were willing to ask to be admitted into the Institution—whether they were willing to be affiliated. The word "affiliate" was a most unfortunate one. A much better word would have been "co-operate." The amount they were to pay the Institution had no weight with him whatever; but they would be practically paying tribute to the Institution. He would much prefer that, if they were to work with the Institution, they should appoint a member to attend certain meetings of the Council, and let them pay the whole expenses of such a gentleman themselves. He supported the amendment with hesitation, because he knew certain benefits would come from affiliation; but seeing that no new information had been put before them, he was compelled, meantime, to vote for the amendment.

Mr. A. Wilson pointed out that the subscription of five guineas paid practically for one visit of the representative to London; but there might be four or five meetings of the Council, or even more, in a year in London, and the representative would get his expenses paid each time by the Institution. Therefore he did not think the Institution were likely to get very fat over what they would receive from the Association. It was all the other way. As to the Association paying the whole of the expenses of their representative, he was afraid that they could not do it; but this was a matter for after-consideration.

Mr. A. Waddell (Dunfermline) was of opinion that it would be quite a mistake if they did not take this opportunity of affiliating. The reasons given against it were very small indeed, and showed, after all, that there was not anything materially wrong with affiliation. It appeared to him that those who were supporting the amendment were standing away from that brotherliness which ought to exist betwixt all gas managers.

Mr. W. Doig Gibb (Newcastle), having been called upon by the President, took the opportunity of thanking the Association, and the President, for extending an invitation to him to attend the meeting. There was really very little for him to say. He came there, first of all, as a patriotic Scotsman; and, secondly, as President of the Institution of Gas Engineers. Therefore he was, perhaps, well qualified to look into the question of affiliation impartially—from the one side as being connected with the Institution, and from the other side as being a patriotic Scotsman who looked with a considerable amount of pity upon anybody who had not been so fortunate in his birth. It would be discourteous of him to enter into controversy, or to attack any opinions stated upon either side; but he could not, for the life of him, consider that any argument could be brought against the proposal for affiliation. The Institution did not make money out of affiliation; they did not interfere, in the slightest degree, with the internal working of any of the Associations who had affiliated; and they had nothing whatever to do with any of their funds. The sole object was to be in touch with every Gas Association in Great Britain and Ireland, so that they could truthfully proclaim to the world that their voice was the united voice of the whole of the gas industry. To make this voice efficient, they asked them to affiliate, and to send their representative to the Council, so that, when they deliberated on schemes for research, or other big questions which they were embarking upon, they might have the benefit of local knowledge from all parts of the country to guide them in what they were investigating and how to set about it. It seemed to him to be a particularly opportune time for the Association to discuss the question, because they were now only, as Mr. Wilson had said, on the eve of starting some large works for research; and they would like, before embarking on schemes which might take three, four, or five years for their successful fulfilment, to have the benefit of a special representative on the Council from the Association, to help them in deciding how best they could spend their money. He was sure he need not take up more of their time, but simply appeal to them to sweep aside the question as to the use of particular words, and consider, once for all, that if ever there was a time in the history of the gas industry when they should be united, and work together for a common cause, this was the time. Let them put away trivialities of wording at such a time, and give their vote according to common sense; and if the vote were not in favour of affiliation, he should go away a very disappointed Scotsman indeed.

Mr. W. Blair (Helensburgh) gave any weight his voice might have in favour of affiliation. He was one of the oldest representatives of the gas industry in the room; and he would like to see them a thoroughly united body, in dealing with research work, or with any legislation that might be proposed on gas questions.

The President read a letter he had received from Mr. W. R. Herring, in which he said:

I am very sorry I shall not be able to be present at the meeting of the Association. I am particularly sorry, on account of the important questions that are to be raised, which affect so seriously the future utility and prosperity of the Association. With regard to affiliation, let me compliment you and the Committee on sending out such a clear and concise circular as is before me this morning. It appears to put the whole case in a nutshell; and I would earnestly urge the members of the Association to carry out the recommendations of the Committee. By doing so, they would be enhancing the importance of the North British Association, as well as advancing the interests of the gas industry in Scotland. It is not right that the Scottish gas industry should be unrepresented when important questions, such as the circular clearly sets forth, are under consideration, and others of equal importance are likely to arise at any moment.

A vote was then taken, by the members upstanding; and the result was: For affiliation, 51; for delay, 13.

Mr. Thomas Wilson asked if the decision could not be made unanimous.

Mr. Alex. Wilson said he was going to ask the same question. The amendment only asked for delay; it would be a graceful thing, on their part, that the minority should fall in with the general feeling of the meeting.

Mr. J. Napier Myers was quite willing. He had said nothing in his remarks to prevent him doing so.

Mr. T. Lighbody had not the slightest objection to this course. His only point against affiliation was the cost; and they would find that out next year, in the balance-sheet.

Mr. D. Robertson fell in with what was proposed; but, at the same time, he would have been better pleased to have been on the winning side. He did not, however, think they should carry the feeling further; and he wished to assure them that the Institution would always have the entire support of the North British Association.

The decision was then declared to be unanimous.

The President remarked that they ought to congratulate Mr. Gibb, the President of the Institution, that the decision to affiliate had been taken during his term of office.

Mr. Gibb said that, of course, he had no mandate from the Council to thank them for their intelligent action in the matter; but he would like to say that, as a Scotch President, their action that day had put a feather in his cap, of which he should always be proud.

Mr. W. Blair, at a later stage, moved that the President of the Association (Mr. L. Hislop) be appointed the first representative of the Association on the Council of the Institution.

This was agreed to.

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## The Presidential Address.

The President then delivered the following

### INAUGURAL ADDRESS.

Gentlemen,—In tendering to you my sincere thanks for the honour which you have conferred upon me by appointing me your President, I can only express regret that I have not been gifted with the flow of eloquence which has characterized some of my predecessors in the chair. The honour to me of being appointed your President is all the greater, considering that I have not on any previous occasion contributed anything to the transactions of the Association.

#### LOSSES SUSTAINED BY THE ASSOCIATION.

I cannot proceed further without first referring to the loss which has been sustained by the gas industry in general, and our Association in particular, by the deaths of Messrs. Wm. M'Crae, of Falkirk, William Young, of Peebles, and J. Hall, of St. Andrews. Mr. M'Crae, as you are aware, was Senior Vice-President of the Association, and, had he lived, would in all probability have filled the presidential chair for the ensuing year. He was a man of strong character, respected by all who knew him, and was always ready and willing to give a helping hand to those who required it. That he had many friends was shown by the number of gas engineers who followed his remains to their last resting place in Falkirk Cemetery. As Mr. Napier remarked at the Informal Meeting in April, "he died far too soon;" and his loss will long be felt by our Association.

Mr. Young, while more closely connected with the shale-oil industry than with gas manufacture, was one of our greatest pioneers in carbonization. He took a strong interest in all matters pertaining to the gas industry, and the papers which he read before this Association from time to time form the most valuable portion of our Transactions. If, as was proposed a few years ago, these could be published (along with his contributions to other Societies) in book form, I feel sure that the volume would prove to be one of the greatest standard works of reference of the present day. The discoveries which he made as a result of his investigations and experiments are innumerable; and the gas industry has in every case reaped the benefit. Therefore, the least that it can do is to commemorate his memory by securing the publication of these in book form, for the benefit of the young men who are yearly entering the profession. His recent experiments in naphthalene extraction, and with the vertical retort as a means of carbonization of coal in gas manufacture, are likely to be of the greatest importance within the next few years.

Mr. Hall was one of the oldest members of our Association, having filled the presidential chair as far back as 1878. In consideration of his previous services, and his high standing in the profession, he was elected an honorary member of the Association at the meeting held in St. Andrews in 1905. The best years of his life were spent in St. Andrews, where he proved himself to be a capable gas engineer; and he has been responsible for the early training of several men who now hold good positions in the gas profession.

#### LACK OF INTEREST ON THE PART OF MEMBERS.

Your Committee have been greatly handicapped during the last twelve months through the non-attendance of some of its members. Out of the ten gentlemen who were appointed to look after the interests of the Association, only six have attended Committee meetings; and this number is not sufficient to carry

on the work of the Association in a proper manner. No gentleman should be appointed a member of the Committee without first obtaining his consent. Then, if he is appointed, and has the best interests of the Association at heart, he will faithfully attend the Committee meetings to support these interests. The present method of voting is anything but satisfactory, as, out of 160 ballot papers sent out, only about 30 are usually returned. It is evident that the remaining 130 members take no interest whatever in the affairs of the Association; otherwise they would at once suggest some method which would remedy matters. If it were not for the strenuous efforts of the few who still take a prominent part in its affairs, the Association would be defunct in a very short time. Something must be done to reawaken the interest of the members; and this can only be done by the members themselves taking part in the proceedings at each annual meeting.

It has been suggested that the Informal Meeting which is held annually in April might be converted into a meeting of this Association; but I venture to think that it is its informality which makes it so gigantic a success, as we hear the voices of gentlemen there who never speak at all at our annual meetings. At the same time, we could with advantage have at least one other meeting in the year—some of the other Gas Associations can have four successful and well-attended meetings. There is a long period between our July meeting and the Informal Meeting in April, during which time many questions arise which could be discussed if we had a meeting (say) about November. No papers need be read; but any member could introduce a subject which was of general interest, and we would all benefit by the discussion thereon. When the Commercial Section comes into proper operation, it will, of course, give members an opportunity of exchanging views on any subject; but, as it will be divided into sub-sections to suit the various districts, the questions discussed will not be of such general interest as they would be at a full meeting of the Association. On referring to our rules, I find it is there stated "that the object of the Association is to devote itself to the encouragement and advancement of all matters connected with gas engineering and manufacture, and that it is established to facilitate the exchange of information and ideas amongst its members."

I venture to think that a great deal of the lack of interest is due to the fact that many of the papers which have been read during the last few years do not appeal to our members who are managers of works making under 20 millions, while these form a large proportion of the membership of our Association. Mr. Campbell's paper to-day should appeal strongly to such members as a means of developing their business; and I feel sure it will be listened to with great interest, and will receive a good discussion. Mr. Smith's paper, on "Naphthalene Extraction," should also be of interest to every member, as naphthalene troubles are becoming more numerous in Scotland, owing to the changes in the character of the coals used; and as the lower seams of coals are now being used in greater quantities, we may look for further troubles. Mr. Yuill is to favour us with his views on the "Practical Management of Gas-Works." This is a subject which appeals to us all, no matter how small our works may be, and, as usual with Mr. Yuill's papers, we shall get information and details which will be well worth listening to. It is a subject regarding which we are all supposed to know a little; and, as each manager thinks his own methods of working are the best, we should be sure of an interesting discussion.

### THE QUESTION OF AFFILIATION.

As you will have seen from the circular which was sent out by the Committee to every member of the Association, that much-talked-of scheme of affiliation with the Institution of Gas Engineers is to be brought before you again to-day. There are many arguments in favour of it; but I have never yet heard any reasonable argument against it. Even if we are the oldest Association on record, we can never hope to attain the standing of the Institution; and by co-operation with them we are assisting in the protection and furthering the interests of the gas industry in general. The question of what is to be the standard burner for testing gas, also of what is to be the photometrical standard of light, is at present under consideration by the Board of Trade; and the Institution have appointed a Committee to approach them with a view of securing the adoption of the No. 2 "Metropolitan" argand burner, and the 10-candle pentane lamp as standards. We can all appreciate the result to gas companies and corporations if these standards are adopted. There is also in contemplation some amendment of the clauses in the "Sales of Gas Acts" with reference to the periodical testing and reverification of meters, and a reduction in the range of error allowed to 1 per cent. instead of 5 per cent. as at present; and no section of our industry is better suited to look after our interests in these matters than the Council of the Institution. All I would ask from the members of this Association is that to-day this question of affiliation should receive fair and unbiassed consideration on its merits, without allowing any national or patriotic sentiment to interfere with our decision.

### CARBONIZATION METHODS AND RESIDUALS.

It is a matter for surprise that, considering the improvements which have been effected in nearly every other portion of a gas-works plant, the methods of carbonization have remained the same as were in use fifty years ago. The experiments which are at present being made with vertical retorts for carbonizing in bulk, will, if successful, revolutionize present methods. There is a large and daily increasing demand for furnace and malting coke; and when one considers that coke makers find it profitable to carbonize coal for coke and other bye-products alone, and can afford to blow-off their surplus gas into the atmosphere, it shows there is ample room for an improvement in our methods of carbonization. The lower seams of coal, which now form a considerable proportion of those used in Scotland for gas manufacture, are well suited for making this quality of coke; and I do not see any reason why a share of this trade should not fall into our hands. If as much attention was given to getting the best value possible for our residuals as is given to getting a large yield of gas per ton of coal, considerable benefit would be derived therefrom, and we would be in a better position to face increases in the price of coal without having to take it out of our consumers by raising the price of gas. I know of at least one works in Scotland where the net revenue from residuals is about 3s. per ton of coal more than the original cost of the coal delivered in the gas-works.

While touching on residuals, I should like to mention specially the manufacture of sulphate of ammonia in gas-works. There are few works making 10 million cubic feet and upwards where it would not pay to manufacture sulphate instead of selling the liquor in its crude state. The plant required is simple and inexpensive, and does not need skilled labour to manipulate it. In making comparisons of various works where sulphate is manufactured and the tar sold separately with others where the tar and liquor are sold mixed, I find that the revenue is in many cases greater from tar alone than in the others from the mixed product—showing that in the latter case the distiller is being paid for taking away the liquor. Sulphate can be manufactured quite as cheaply in the gas-works as in the distiller's works; and the saving in railway freight alone yields a handsome profit. There is practically no competition in selling the crude products; and we are compelled to accept what the distiller (in his mercy) cares to offer us. On the other hand, with the finished product we can always command full market value.

### RETORT-HOUSE MACHINERY.

Great improvements have been effected within the last year or two in stoking machinery, more especially with the projector forms of it, which are much less expensive and more suitable for use in moderate-sized works. Where these are in use, combined with a proper scheme of coal and coke handling plant in such a manner as to almost totally dispense with hand labour, one finds ideal conditions of working. Anything which can be economically done to improve the conditions of labour in the retort-house is a step in the right direction. But there are very few works in Scotland of sufficient size to make such a scheme profitable; and we await with interest the publication of the working results of some of the more recent installations.

Retort-house governors are now being largely introduced on to the foul-main between the hydraulic main and the condensers, as a means of equalizing the suction of the exhausters. It is claimed that, by the use of these governors, an increased make per ton is obtained. But even apart from this, the fact of being able to maintain with safety a steady suction on the retorts, with a minimum of seal on the dip-pipes, and a freedom from the pulsations which result in the formation of carbon, is sufficient to warrant the expense of their adoption.

The process of condensation to which our gas is subjected still remains practically a sealed book to all of us, and it is difficult to know what forms of condensing appliances are most suitable. There is no doubt but that the method of condensation has a great deal to do with the naphthalene troubles which many of us suffer from, as in some works using a certain coal carbonized at a certain temperature one finds any number of naphthalene troubles; while in neighbouring works, using the same coal and carbonized at practically the same temperature, no naphthalene is found anywhere. The theory of keeping the gas as long as possible in contact with the lighter hydrocarbons—*i.e.*, by slow condensation—and thereby dissolving out the naphthalene, seems to be the most feasible. But, owing to the sudden changes of temperature to which we are subjected in this wonderful climate of ours, this is very difficult to carry out in practical working.

### PURIFICATION.

Now that we are no longer troubled with sulphur clauses, managers are going in more for purification by oxide of iron. With efficient scrubbing plant, the sulphur compounds and carbonic acid in the gas can be reduced to a minimum; and as the carbonic acid acts as a carrier for some of the lighter hydrocarbons, its presence in the gas does not materially affect the lighting and heating value to the consumer. The cost of purification by oxide is much less than that by lime; and when one takes into consideration the extra labour required in handling the lime, and the nuisance arising from the disposal of the spent material, I venture to prophesy that the use of lime will soon be altogether abolished in gas-works, as even in the smallest works considerable economy can be effected without any structural alterations in plant.

### RESEARCH WORK.

At a meeting of the Manchester District Institution of Gas Engineers in February last, the President (Mr. Prince, of Stoke-on-Trent), in the course of his address, remarked that at no period in the history of gas manufacture had Science played such an important part as it is doing to-day. Our Association has about

£170 standing to its credit in the Research Fund. We have many men in our own ranks who devote a considerable amount of their spare time to laboratory research work; and if a grant was made occasionally from this fund, it might tempt some of these men to come forward and give us the benefit of the results of their investigations. If it were left in the hands of the Committee, with power to administer the fund in this manner, we would have a much better return from it than we get from investment in corporation stock; and I have no doubt that our appeals for subscriptions to this fund would meet with a much better response.

### HIGH-PRESSURE DISTRIBUTION.

Now that our streets are so much taken up with electric power cables, telegraph and telephone cables, tramways, and other accessories of later years, we have considerable difficulties to face whenever we contemplate any increase in our distributing plant. But high-pressure mains have done a great deal towards solving this difficulty. In the excellent paper delivered by Mr. R. M. Searle, of Rochester (N.Y.), to the Institution meeting in Dublin last month, the author described the ease with which a large volume of gas can be conveyed and distributed through pipes of very small diameter; and when it is required to deliver gas to some district a good many miles distant from the gas-works, the saving in capital expenditure by the adoption of this system will be considerable. The various forms of underground steel mains which are now on the market are proving to be a great boon to managers in colliery districts, where there are numerous subsidences from the underground workings. They give absolute freedom from breakage, besides which the initial cost, inclusive of laying, is less than cast-iron pipes.

### COMPETITION FOR POWER AND LIGHTING.

Suction gas is proving a formidable competitor for power purposes; and it behoves us to give every facility to users of power to enable us to keep this class of consumer. It is claimed to be much cheaper per unit of horse power than coal gas; but if the expenses of cleaning and keeping the suction plant in order, together with the risk attending its manipulation, are taken into account, it is questionable if there is any economy, especially with plants of under 30 B.H.P. We are also having strong competition from large electric power companies who have sprung into existence within the last few years. These are offering electricity for power purposes in some cases at less than ½d. per unit.

Gas is still more than holding its own for street lighting, as may be seen from the number of large towns which are gradually reverting to the use of incandescent gas lighting. A splendid example of what can be done with high-pressure incandescent gas lighting can be seen in the new Kingsway in London, which forms a great contrast with the neighbouring streets where electricity is the sole illuminant. It is unfortunate that the superintendence of the lighting of many of our smaller towns and villages in Scotland is in the hands of men who have no technical understanding of what is required, and who take no special interest in its efficiency. Nothing is more annoying to the gas manager of the town than to see broken mantles and dirty lamps all over the streets. Where the street lighting is under the control of the gas manager, and with the use of proper burners and good wind-proof lamps, it forms one of the best advertisements a gas undertaking can possibly have.

### TRAINING FOR THE GAS PROFESSION.

There are many young men at the present time desirous of entering the gas profession; and it is very difficult to advise them as to what course of training they should undergo. The engineer of even a moderate-sized works must now have a thorough knowledge of civil engineering, mechanical engineering, electrical engineering, architecture, building construction, chemistry, &c., besides which he must have a sound commercial training to fit him for conducting the commercial department of the gas undertaking; and when one sees the remuneration that is offered for many of the positions which have been advertised within recent years (and which in many cases is barely a living wage), it is surprising that young men entering the profession should consider it worth the years of hard work and study which are necessary to acquire even a general knowledge of the various subjects.

There are many other subjects of pressing interest which I might have touched on to-day, but time will not permit, as we have a great amount of business to get through. I have perhaps mentioned some subjects which may have caused some feeling on the part of some of our members; but I have only done so in the interests of the Association, and I feel sure they will take my remarks in the spirit in which they are given. The interests of the industry in general, and of this Association in particular, ought to be the primary consideration of every individual member; and it is only by attention to these that we shall be able to keep abreast of the times, and thereby give our consumers the best possible value for their money.

Mr. W. BLAIR (Helensburgh) said he had much pleasure in asking the members to pass a hearty vote of thanks to the President for his able and instructive address, and also for his conduct in the chair during the past year.

The vote was heartily accorded; and the PRESIDENT returned thanks.

Mr. J. W. NAPIER said he wished to associate himself with Mr. Blair's motion, for the purpose of referring to the matter contained in the report of the Committee, of the publication of Mr. William Young's papers. He hoped that this would not be lost sight of, and that the Committee, in carrying out the instructions of the Association, would see that the papers contributed by Mr. Young to the West of Scotland Association many years ago, which were of extreme value, as well as those he contributed to their Association, and the papers he sent to the "JOURNAL OF GAS LIGHTING," and so on, should be included. He would like also to make brief reference to the Research Fund. He considered the occasion had arisen when the Committee should seriously consider the granting of small amounts, from year to year, to those members who desired to carry out particular investigations. The Chemical Society of London made, from time to time, contributions of from £10 to £30, to the foremost scientists of the day, for the purpose of buying apparatus and for other requirements in connection with particular research work.

### READING OF PAPERS.

The reading of the three papers prepared for the meeting was then commenced. One of these, with the discussion thereon, will be found in another part of the "JOURNAL;" the others will be given next week.

### THANKS TO READERS OF PAPERS.

At the conclusion of the technical part of the proceedings,

Mr. A. WILSON proposed a vote of thanks to the readers of the papers. If the younger members would take a word from one of the older hands, he thought it would be greatly to their credit; and it would be vastly to their advantage if they were more free in giving papers to the Association. Mr. Campbell had set them a good example. He (Mr. Wilson) had had a good deal to do with the Scottish Junior Gas Association, and on all hands it had been admitted by the young men who had taken part in its meetings that not only had the Association benefited, but that the readers of the papers themselves had derived an immense amount of benefit from the way in which they had had to look up the various subjects. He was sure the same thing would occur in their own Association. At the same time they were all delighted to have had such an excellent round of papers that day.

The motion was cordially adopted.

### ELECTION OF OFFICE-BEARERS.

The PRESIDENT reported that, as the result of the ballot, the following had been elected office-bearers for the year:—

*President.*—Mr. W. Blair, of Helensburgh.
*Vice-Presidents.*—Mr. James D. Smith, of Stirling; and Mr. A. Waddell, of Dunfermline.
*Members of Committee.*—Mr. Samuel Milne, of Aberdeen, Mr. P. B. Watson, of Wishaw, Mr. G. Keillor, of Broughty Ferry, Mr. Charles Fairweather, of Kilmarnock, and Mr. D. Robertson, of Dunoon.
*Secretary and Treasurer.*—Mr. R. S. Carlow, of Perth.
*Auditor.*—Mr. R. B. Main, of Glasgow.

### RESIGNATION OF THE SECRETARY.

The PRESIDENT said he had received a letter from Mr. Carlow, conveying his resignation of the offices of Secretary and Treasurer, to take effect as from June 30 next. His resignation at that time would enable him, during the winter months, to collect all the books and papers belonging to the Association, and be ready to hand them over to his successor. Mr. Carlow added that he had to thank the President, all the Past-Presidents, and the members of the Committee and of the Association generally, for their uniform courtesy and kindness in assisting him to carry on the work of the Association for the long period of twenty-one years. He should always appreciate with pride and pleasure the long and kindly intercourse he had had with the members, and would remember the many happy days he had spent with them at their meetings and excursions. He (the President) said they regretted very much that failing health had forced Mr. Carlow to send in his resignation. Meanwhile, it would fall to them to appoint a Joint Secretary and Treasurer as from the 30th of June next. According to their rules, an appointment could only be made at an annual general meeting.

Mr. T. WILSON said he was exceedingly sorry to hear the contents of Mr. Carlow's letter, and especially to learn that his resignation was on account of ill-health. He had pleasure in moving that Mr. J. W. Napier, of Alloa, be asked to take the Joint Secretaryship.

Mr. NAPIER said he was afraid the matter had not been sufficiently before him to enable him to at once give consideration to the responsibilities connected with the office.

Mr. D. ROBERTSON, as one of the Past-Presidents, regretted very much to hear that Mr. Carlow intended to sever his connection with the Association. During the time he was in office, he found Mr. Carlow most attentive to his duties. He was an excellent Secretary; and he was sure no one whom they might appoint could fill the place more efficiently than Mr. Carlow had done.

The PRESIDENT suggested that it might be left to the Committee to appoint an Interim Secretary, when the time came.

Mr. CARLOW expressed his willingness to prepare for, and to carry out the arrangements connected with, next year's meeting, as he had been doing. The date in his letter was given on account of its being the close of the financial year. By this

arrangement the members would have time to consider what they intended to do.

Mr. J. Napier Myers remarked that it was just in keeping with Mr. Carlow's character that he should voluntarily offer his services in the way mentioned.

The suggestion of the President was adopted.

Closing Proceedings.

Mr. W. B. M'Lusky, as the Past-President, presented Mr. Hislop with the President's Medal.

The President, in returning thanks, expressed the pleasure he had had at having so successful a meeting, and at having settled all their delicate questions so satisfactorily. He proposed a hearty vote of thanks to Mr. Carlow.

Mr. Carlow having briefly acknowledged the vote,

Mr. J. Hepworth (Edinburgh) proposed a vote of thanks to the Committee of the Philosophical Society, for the privilege of holding the meeting in their rooms.

This was carried, and the business of the meeting closed.

The M'Gilchrist Memorial.

Mr. W. B. M'Lusky made a statement with reference to the M'Gilchrist Memorial—speaking (as Convener of the Informal Meeting) to the gentlemen present as gas managers accustomed to attend that meeting. He said he wished to have their approval or disapproval of what the Committee appointed at the last Informal Meeting had done, in order that the Committee might be enabled to handle the matter in a practical way before the meeting next April.

Dinner and Excursion.

In the evening, the members and a large number of friends, including ladies, dined together in the Grand Hotel—Mr. Hislop in the chair. The toast of "The North British Association of Gas Managers" was proposed by Mr. R. G. Shadbolt, of Grantham; and that of "The Institution of Gas Engineers and other Gas Associations" by Mr. J. Hepworth, of Edinburgh. Mr. W. Doig Gibb and Mr. W. Prince responded.

On Friday an excursion took place, in moderately fair weather, to Campbeltown; going by rail to Wemyss Bay, thence by the turbine steamer *Queen Alexandra*, and returning by steamer and rail, *viâ* either Wemyss Bay or Gourock.

## Mr. Maurice Graham.

We learn from Mr. Maurice Graham that, as from the 15th inst., he has resigned all his interest in the firm of Messrs. Graham, Morton, and Co., Engineers and Contractors, of Leeds, as he has decided to devote the whole of his time to his consulting work. He purposes making, as his specialty, gas-works construction and machinery for the transmission of materials—having had a large and varied experience in these branches during the past twenty-five years. On the 19th of October next, Mr. Graham will leave England by the P. and O. Company's s.s. *Caledonia* for a twelve months' tour round the world, visiting Egypt, India, Burmah, Australia, New Zealand, the Philippines, China, Japan, the United States, and Canada, and he intends inspecting as many of the labour-saving plants as he possibly can. His tour will be prolonged in India, Japan, and Canada. He combines business with pleasure, as his main commission is as Consulting Engineer for a large London Syndicate. On his return to London in October, 1908, he will permanently establish his office in Westminster. Mr. C. A. Goodall and Mr. W. B. Leech (both of whom have been with Mr. Graham for the past ten years) have taken over, and will carry on, the business of the Leeds firm.

**Companies Wound Up Last Year.**—The annual report of the Comptroller of the Companies Department of the Board of Trade (Mr. G. S. Barnes) on the working of the Companies (Winding Up) Act, 1890, for the year ended Dec. 31 last, has been published as a House of Commons paper. Mr. Barnes gives the following summary of the results of the year as regards additions to, and removals from, the register: Total number of new companies, 4395, from which should be deducted (1) the companies which went into liquidation (excluding two cases in which winding-up proceedings were stayed) 1728, and (2) companies removed from the register under the provisions of the Companies Acts, 1880 and 1900, 1759—together 3487; showing a net increase of 908 during the year.

**"Ruegg's Employers' Liability and Workmen's Compensation."**—We have received from the publishers, Messrs. Butterworth and Co., the seventh edition of the above-named work. The author (Mr. Alfred H. Ruegg, K.C., of the Middle Temple and Western Circuit) has divided his work into two parts, in the first of which he deals with the Employers' Liability Act, 1880, and in the second with the Workmen's Compensation Act, 1906. The text is followed by a full appendix containing the statutes relating to, and the cases decided on, the previous Workmen's Compensation Acts in England, Scotland, and Ireland; the County Court Rules of Procedure under the Act of 1906; and the Home Office regulations and forms. Mr. Ruegg has treated his subjects in a thoroughly exhaustive way, and has placed before his readers a mass of valuable information. The matter occupies 732 pages, and is followed by a useful index occupying 42 pages more.

# NOTES ON NAPHTHALENE EXTRACTION.

By J. D. Smith, of Stirling.

**[A Paper read at the North British Association of Gas Managers last Thursday.]**

Most of us have doubtless ere now become alive to the fact that the tendency of modern Scottish gas practice, at any rate so far as the manufacturing side is concerned, is that the more nearly it approaches that of our friends south of the Border, the more we begin to appreciate and understand their particular difficulties.

In the old days, with our splint and good cannel coals, naphthalene troubles, as known in England, may be said to have been non-existent among us. Slowly, but surely, the gradual reduction of candle power, and the substitution of what one may term a more common class of coal for gas-making purposes, has brought about the difficulties of which we have heard so much from our southern friends in the past—more particularly the deposition of naphthalene in our manufacturing plant, and in some cases in our distribution system also. At any rate, such is my own experience; and after suffering considerable inconvenience, not to say annoyance and expense, I decided to introduce some form of friction extracting, with a view to ascertaining its efficiency or otherwise upon the naphthalene trouble.

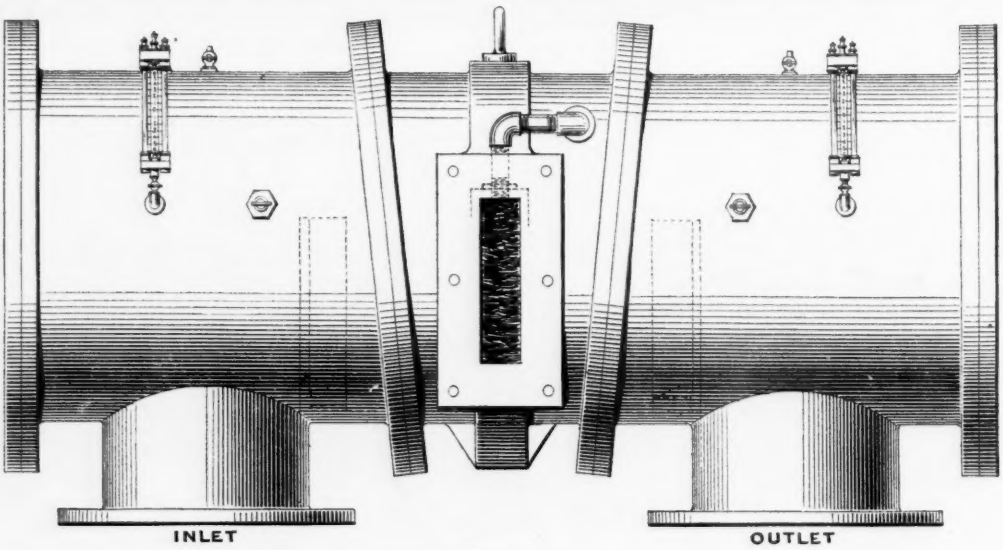
Many careful inquiries decided me to recommend the adoption of what is known as Everitt's tar-extractor—the invention of Mr. W. Everitt, the Engineer and Manager of the Ilkley Gas-Works, Yorkshire; and my sole reason for laying the matter before you is the positive manner in which this apparatus has achieved all that was expected from it. The extractor was fixed at our condenser inlet in March of this year; and though at first sight it might appear a very short experience from which to speak, still, as the present is the period of the year during which we have in the past had the most trouble—namely, April to September—and this season, up to the present, this trouble has disappeared, I venture to name the matter as of possible service to others similarly placed.

The features of the extractor which operated most in deciding my adoption of it were its extreme simplicity, the open nature of the parts offering resistance to the gas, and the ease of adjustment of the same. In practice, we find that 1 inch of differential pull is all that is required to bring about the desired result; and, in passing, let me state that no difference in either the quantity or quality of the gas made has been discovered up to the present time. Briefly, the apparatus may be described as a high-temperature-extractor; for one great essential is the maintenance of a certain minimum temperature, which keeps the tar vapours arrested there in a thin, oily condition, which experience proves to be the most suitable for the abstraction of the contained naphthalene. In my own case, for reasons of exhaust steam not being at hand, and to ensure as constant a temperature as possible, I have departed from the usual practice of heating by the use of intermittent puffs of exhaust steam, and adopted instead the use of a continuous stream of live steam. The increase of temperature between the inlet and outlet ranges from 8° to 10° Fahr.; a comparatively slight increase being all that is necessary, as the inlet temperature averages 90° Fahr. I am fully aware of the fact that this apparatus was originally designed for the purpose of the removal of tar-fog, an operation which is clearly becoming more and more important in regard to its bearing upon the remaining purification processes—particularly upon the dry purification, or rather, should one say, the purifying media?

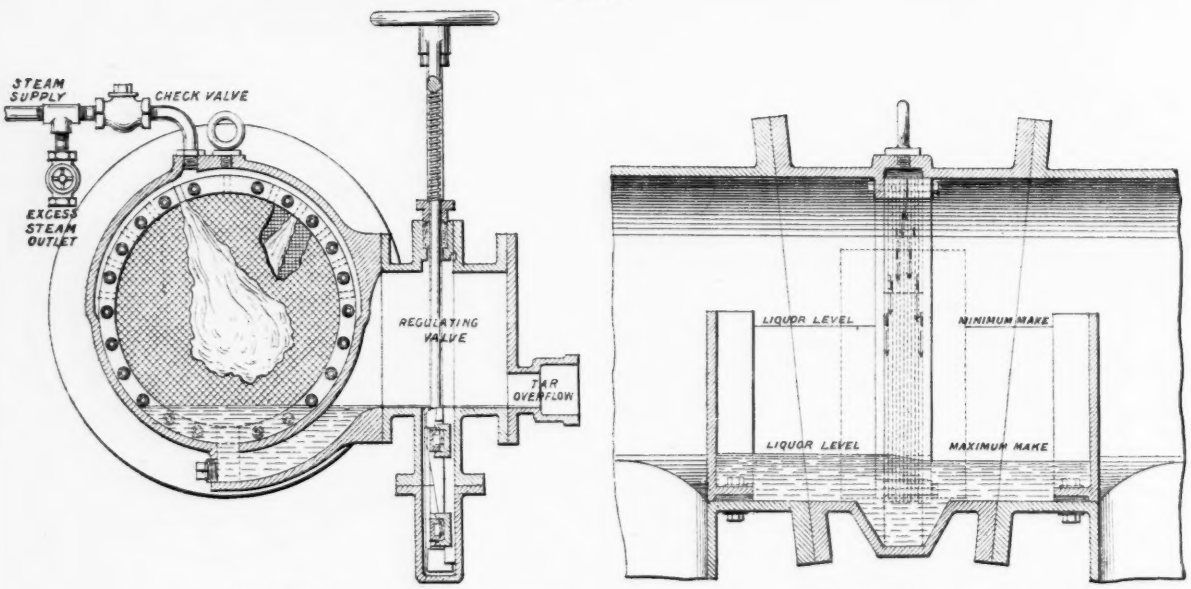
One very evident proof of the reduction of tarry matter from the use of this extractor in my own case is the greatly increased lubrication required in the exhauster as compared with that necessary previous to the introduction of the extractor. But its chief value to me lies in its effect upon the naphthalene, which, as I have already stated, has quite disappeared, both on the works and in the district of supply; the public lamps, which have hitherto shown the greatest sensitiveness to naphthalene deposits, being now quite free. During my preliminary inquiries, I was informed of one case where the distributing system taken over from another undertaking, and highly charged with naphthalene, was in a few months quite cleared by the use of this extractor.

No one would expect the apparatus to clear out the whole of the tarry matter, particularly with such a low absorption of pressure as I have chosen to work it—viz., 1 inch. Still, it does undoubtedly, to a large degree, separate the heavy tar from the lighter oils; for I quickly found that we could utilize these lighter oils to accelerate the clearance of deposited naphthalene throughout the works by bye-passing the condensers, which, as you remember, follow the extractor, thus allowing these lighter oils to travel a much greater distance through the subsequent apparatus than they otherwise would have done. Their influence in the washing apparatus and purifiers, and even in the distributing system, has been to liquefy and render harmless the naphthalene content. It is to this bye-passing of the condensers following the action of the extractor that I attribute the effective and rapid disappearance of our naphthalene troubles.

I am not in a position to state the amount of naphthalene contained in either the crude or finished gas previous to the introduction of the extractor; but latterly I have taken measures to ascertain the actual efficiency of the extractor from the naphtha-




Elevation.




Cross Section. Longitudinal Section.

**Tar Fog and Naphthalene Extractor.**

lene point of view. The following may be taken as a fair example of the tests made: Sample streams of the inlet and outlet gas are aspirated simultaneously, and subjected to analyses by means of the Smith and Colman method, by which the gas is first treated with citric acid to absorb ammonia, and afterwards with picric acid solution to absorb naphthalene; the solution containing the picrate precipitate being titrated with barium hydrate, using lacmoid as an indicator. The result shown is—

| | | | |
|---|---|---|---|
| Inlet gas contained | . . . . . | 43 grains per 100 cubic feet | |
| Outlet gas | ,, . . . . . | 19·7 | ,, ,, ,, |

giving 54 per cent. efficiency as a naphthalene extractor.

Of course, the actual remaining naphthalene content in the finished gas is of little use as an indicator of the deposit limit, as this must always depend upon the quantity of solvents in intimate contact with it. But once the overloading point is reached, the most rational course is to utilize the solvents contained in the crude gas at the earliest possible moment; and, these once extracted, well saturated, little trouble is likely to ensue.

The thanks of ourselves and others are certainly due to Mr. Everitt, who raised this question in such a practical and simple form (I think about six years ago) when his apparatus was originally designed. Reference should also be made to the report on this question so ably compiled by Messrs. White and Clary, of the Michigan University, who were among the earliest to clearly point out the value of hot tar as a solvent of naphthalene; and I would further remind you of the valuable contribution bearing upon the question by Messrs. Clayton and Skirrow, submitted to a recent meeting of the Manchester District Institution of Gas Engineers, in which I could have desired some tests of the efficiency of the apparatus I now refer to had been submitted, as I am perfectly satisfied of its efficiency as an extractor of suspended tarry matter, though not in a position to demonstrate it in such a scientific manner as the authors of the paper alluded to. Further research on the lines laid down by them is imperative.

As I believe this is the first extractor of its kind to be introduced into Scotland, possibly a brief description of its action may not be out of place. The principle upon which it is constructed is more that of the strainer than of impact; the gas having to work its way through a series of fine gauze discs. But in addition to the process of straining or sieving, is that of buffeting the gas about in the spaces between the gauze discs, which is effected by means of a number of jets of steam—either live steam or exhaust if convenient—the jets playing downwards, but at varying angles from the vertical. The action effects a threefold purpose—viz. (1) A whirling movement against the faces of the discs, as well as the passage through, thereby increasing the efficiency as a tar and naphthalene remover; (2) the maintaining of a temperature necessary to keep the naphthalene in a soluble condition and the tars more liquid; (3) the cleaning of the gauzes. Incidentally, I may state that the quantity of steam necessary to effective action need not have any ill effect upon the strength of the ammoniacal liquor.

The method of drawing off the deposited liquids is of the simplest; an ordinary hydraulic main weir-valve being all that is necessary. With a light make, the valve would be almost closed; thus raising the level of the liquid and reducing the exposed part of the discs; while at full capacity the valve would be opened wide, exposing the full area of the discs—the best rate of the flow of gas as observed by experience being the determining factor. In my own case, 1-inch differential pressure or pull is taken as the indicator.

The simplicity of construction and action will, I think, appeal to all; and if my brief narrative should be of benefit to any of our members, I shall feel justified in having claimed your attention.

*Discussion.*

The PRESIDENT hoped that, as the subject was one in which they were all more or less getting interested, there would be a good discussion.

Mr. J. M'Leod (Kirkintilloch), in opening the discussion at the request of the President, said he had never made experiments with naphthalene deposits, for the simple reason that they never had such deposits; but he had highly enjoyed Mr. Smith's paper, and it was very interesting to hear how he had dealt with the problem. There was only one point—he noticed it recently, when on a visit to Birmingham—and that was that the oil they were using there for the removal of the naphthalene did not take it all out. It merely volatilized it to a certain extent, and carried the naphthalene along with the gas. There seemed to be a general idea that the naphthalene-extractor was an apparatus for extracting the naphthalene entirely. This was not quite correct. The naphthalene only went into a solution with the extracting oils; but the oil itself volatilized, and acted as a carrier for the naphthalene with the gas.

Mr. Thomas Wilson (Coatbridge) asked Mr. Smith whether the system was first put in use as a tar or a naphthalene extractor. He had a similar apparatus—not quite the same, but it served a like purpose—a Livesey tar-extractor; and it was one of the most efficient pieces of machinery they had in the place. It took out the last trace of the tar. It was after the condenser, not before it. He was astonished to hear that anyone in Scotland had been troubled with naphthalene. He never saw naphthalene in Scotland except once, when they were using two cargoes of Newcastle coal, at the time of a miners' strike. He had, however, had some experience with it in England. He had had to steam 18-inch pipes twice a day; but this was due to the class of material they were using, and to the heat they were distilling it at.

Mr. A. Yuill (Dundee) said the subject was one which had forced itself upon them for their consideration. It was one of the points he touched on in his paper. He possibly might have said more about it had he not discovered that Mr. Smith was going to deal with the question. Mr. Wilson had just given him, so to speak, a text to speak upon. He was pleased to learn that Mr. Wilson had not had any trouble with naphthalene, in one sense; and it was unfortunate for Mr. Wilson, in another sense, that he had not, because it was well known that if they worked with high heats, and used a coking coal, as they had in Scotland, they would have naphthalene. He would rather have naphthalene, with a higher yield, and with the trouble of taking it out, than of working at lower heats, and not have naphthalene. The whole thing came to be a question of heats. It sometimes presented itself in such a manner as they could see their way out of it. Mr. M'Leod mentioned that some had gone on the lines of trying to keep the naphthalene in suspension. This could only be so if they allowed the vapours of what they termed the lighter oils to remain in suspension. But this was sometimes difficult to do. If they considered the process of condensation from the retorts right on, they had the thick tars deposited first; they then got the other tars, of a different gravity, in the condensers; and sometimes, no doubt, they would be surprised to get tar even after the condensers and washers. It was the tars they got in the scrubbers that they would like to keep in the gas, if they would not have trouble, because it was these tars which, in a volatile state, had the property of keeping naphthalene in suspension. They all knew the value of naphthalene for its light-giving properties; consequently they did not want to lose it—and they could only keep it by maintaining the vapour tension in the gas right on to the burners. Some of them discovered a method of keeping the naphthalene in suspension in a scientific way; but the experience was gained in a practical manner. It was discovered that, in allowing the tar to travel back to the condensers, they at once got rid of naphthalene; but, at the same time, they were losing some of the hydrocarbons in the gas. The way in which Mr. Smith had dealt with it was more scientific. Mr. M'Leod mentioned that it was not advisable to take all the naphthalene out. They did not want to take out the naphthalene if they could keep it in; and one way this could be done was to impart to the gas, if they thought it advisable, the vapours of a light hydrocarbon oil, so as to raise the vapour tension to such a point that the naphthalene would remain suspended in it. He had done so; but, even with this, he was not able, with the large volume of gas that was going out, to add a sufficient quantity of the tar-oil vapours, so as to retain all the naphthalene in suspension. Although he put in two or three barrels of the oil in a day, still he was troubled with naphthalene. He had only had the Livesey washer erected for a week, and was not in a position to give them any data about it; but some others who had had experience with it might perhaps put their results before them, so that they would be able to consider all the points.

Mr. W. Prince (Stoke-on-Trent) expressed his gratification at being present as representing the Manchester District Institution of Gas Engineers. They had before them the kind of subject which was conducive to the education of the profession. He felt sure they had had enough of the threshed-out systems of how to manage their works, and the several component parts of the works—purifiers and the like. But in dealing with such a trouble as naphthalene, Mr. Smith was on a theme which would repay him for all his trouble, and which they could all discuss with profit to themselves. He could not say, like many of his Scotch brethren, that he had never had any troubles of this sort. He had had, he thought, his full share of them. For the last 25 years naphthalene had been ever-present with him, as a great curse. He had attempted many solutions of the problem. He had not adopted the Everitt method; but he had reason to believe that any such form of wire-drawing the gas would tend to free it from naphthalene at least. He had been a devoted follower of the system advocated by their friend Mr. Colson, of Leicester; and he firmly believed that it was one of the finest means for removing the trouble they had to contend with. They rarely had so much as 10 grains of naphthalene per 100 cubic feet of gas; and he might say that they made a special point of testing for naphthalene, just as they did for sulphur or any other compound. He went through the works at Leicester several years ago, to see what the wonderful discovery was which Mr. Colson had claimed; and it was on the same lines, he thought, that Mr. Yuill was going. The Livesey washer was employed. He introduced into it something like 80 gallons of a creosote solvent, which cost, at the present time, about 3d. per gallon. This was, of course, returned, after separation, to the tar-well; and they obtained something from this source, in the way of economical production. With Durham coal—he was speaking now of his Darlington experience—they regularly had, during the winter part of the year, from 2000 to 5000 complaints per day from 9000 to 10,000 consumers. This was very serious; and over and above that, perhaps one-half of the street lamps were of no effect. He never knew a place where they had so much trouble as at Darlington, with Durham coal. In Staffordshire, they had, he thought, six works within a radius of 12 miles, all using the same coal, from the same collieries, and at the same price. One works would be troubled with naphthalene; while another would not see a trace of it. Newcastle-under-Lyme was immune; but Stoke-on-Trent had all the anxiety and worry of naphthalene. He had, in the manufacturing process, to carry the gas across a canal to the purifying station. He had had an 18-inch main there, with just 1 inch of room on the top of it left for the gas to go through; the rest was solid naphthalene, which had to be shovelled out. Mr. Wilson had told them that he had had to steam twice a day. He (the speaker) had had the same experience—very much of it. It led them to think what was the cause of the trouble, when they were all using the same class of coal, and when they found that one man's plant was free, and another's was saturated with naphthalene. Mr. Yuill had said he would rather have naphthalene, with its attendant troubles, than a low yield of gas. He should like to call Mr. Yuill's attention to the experience at Sheffield, where they had probably the cheapest gas in the world, the lowest yield of gas per ton, and the greatest trouble from naphthalene. So it was not at all an established fact that, with a low yield of gas, they had immunity from naphthalene. In Newcastle-under-Lyme, they made something like 12,000 cubic feet per ton; and they had no naphthalene. He was content to leave the hydrocarbons in, and to take gas to the extent of 7500 cubic feet per ton; and he got naphthalene. It was one of the most difficult things to reason out why it occurred at one place and not at another. Probably Mr. Shadbolt would be able to tell them something about it. Mr. Yuill had expressed his views as to one *modus operandi* which, he believed, Mr. Shadbolt claimed as his own—that was, to retain the light oils, and so enrich at very little cost. Mr. Shadbolt was a great success in some things. He did not know that he had yet reached everything that he desired; but they all strove, to their very utmost, to elucidate schemes and means for not only improving their business, but for also bringing in good dividends. He could talk upon this subject for any length of time. He introduced it in his Presidential Address to the Manchester Institution last February.* He sincerely trusted that the action which their Association had taken that day, in agreeing to affiliate, would have the effect of bringing the best brains they had in Scotland to the Council of the Institution. He would assure them they were desirous of getting the best possible light upon this subject. He hoped the Institution would persevere with the efforts made by the Southern District Association, for the elimination of this serious naphthalene trouble. It was a most complex problem, and it deserved all the attention it was receiving to-day.

Mr. R. G. Shadbolt (Grantham), in the first instance, as ex-President of the Eastern Counties Gas Managers' Association, offered them hearty greetings. The Gas Associations of the United Kingdom, he said, were gradually overlapping, until one found himself, as he did, a member of the Eastern Counties Association, of the Manchester District Institution, one of the Irish Association, and a visitor to the North British Association. Districts were beginning to lose their individuality, and to merge into one great whole. There was not the least doubt that District Associations had their great uses, in dealing with problems which occurred in, and which were peculiar to, the particular localities. It was certainly interesting to those of them who were visitors, to see that they were beginning, in Scotland, to experience the same troubles which they in the South had been accustomed to face for some considerable time now. He would just like to give them, as briefly as he could, his own view of the naphthalene bogey. Everyone had a right to his opinion; that was a thing of which no man could rob him. Bearing in mind the great work and the valuable contributions of their late respected member, Mr. W. Young, the researches of Dr. Colman in connection with the Southern Association, and the contributions of others on this particular problem, it appeared to him that they had to deal with the question, or that they had a choice of dealing with it, in three distinct ways. They all made naphthalene, of course. Even Mr. Wilson made naphthalene; but he somehow managed to get it through to the consumers' burners. Mr. Wilson had a great percentage—which would in all possibility astonish him—of

* See "Journal," Vol. XCVII., p. 528.

naphthalene in his crude gas; but fortunately for him, Nature effected a cure which others were called upon to provide by artificial means. They had to assist Nature; in Mr. Wilson's case, Nature assisted him. But still, naphthalene was there. The first method he would mention of dealing with deposited naphthalene was to use the light oils, or the vapours, or whatever they chose to term them, which were capable of dissolving the naphthalene and carrying it down. Mr. Smith had commenced at the right end, to his mind, by endeavouring to remove the excess of naphthalene by the first of the three alternatives. The next method was to utilize solvents, of whatever character they might be, in abstracting the naphthalene, or a portion of it, after it had further proceeded on its course, and taking it out by this means. The third option was—bringing one's mind to the conclusion that, after all, the percentage of naphthalene was not very great, and, as Mr. Yuill said, it was of some value if they could retain it—the introducing of a certain vapour to retain it, either in a vaporous or semi-vaporous condition, and passing it on to the consumers' burners. He took it that each man must deal with his own peculiar difficulty in his own peculiar way, and decide as to which method, under the circumstances, would be the best.

Mr. W. B. M'Lusky (Perth) had had some experience in the elimination of naphthalene. In a question of this kind their experience of to-day might be of very little value a year hence. It was rather a humiliating thing to see, twelve months afterwards, the silly things they had said as the result of immature experience in the beginning. He had never had more than 8 grains of naphthalene in his gas; and he had had no stoppages. His difficulty at present was that the naphthalene had got a start in Perth. It had affected the holders, and, he might say, particularly in one of them, where there was no trussing, they found very little trace of it. They had another holder—a very strong one—about twenty-five years of age, which contained pretty substantial trussing; and they found this holder contained about as much naphthalene as would occupy them for years to come. Their scheme was to keep the holders very low in summer, and then, in the event of a sudden rise of temperature, they had the smallest content possible of the holder exposed to the rays of the sun. They had no naphthalene in the gas-works, nor had they had any for eighteen months. They had managed to eliminate it by washing with tar from Pintsch's oil-gas process. This was introduced, not so much to eliminate naphthalene as to carburet air for the revivification process in the purifiers; but it happened that when they started to test for naphthalene, they found the first two or three limbs of the vertical pipe condenser very much freer from naphthalene than other parts of the works. Their first experience of naphthalene in the works was in connection with some tower scrubbers. They found naphthalene in solid form at the outlet from the columns. They treated this pipe with tar, and found that they were clear to the holders; but in warm weather—from May to September—he had to be very careful to add solvents to the gas. Till last January, he had not used anything but benzol for this purpose. In the hope of benefiting by Mr. Shadbolt's experience with Bourne's "Gazine," he had tried it in the gas-works, with no result whatever—which was just another evidence that the conditions that they had were different from Mr. Shadbolt's conditions. Now, however, after a visit which he recently paid to one of his friends who was there from the South, he had enlarged his experience; and he had never had more than two stoppages in a day during the past summer. But perhaps the most interesting experience he had had was in watching others; and he believed that Mr. Bell's system, at Derby, was the simplest and most efficient he had seen. Mr. Glover's method, at St. Helens, was very much on the same lines—and who should say which was the best? He could not tell; but certainly both these gentlemen could command a success which, he was sorry to say, he could not do at the present time. Mr. Bell had a scheme which was practically on all-fours with that one. Mr. Bell used the first column of an annular condenser, taking away the inner tube, and employing the outer one as a scrubber. He pumped into it the residual tar from the Pintsch's oil-gas process, with a temperature of 170° Fahr. for the incoming gas. Mr. Bell found that this did not give sufficient area; but he had another process, which was quite clearly distinct from the last one. This was the process which they had had at work in Perth for two months now; and it was a very simple one. They had to use "Lucigen" oil, from the Scotch blast-furnaces, or the naphtha which Mr. Bell had specially prepared, coming over at about 200° C. This naphtha, used in a washer, with an addition of 10 per cent. of benzol, seemed to do the work in reducing the stoppages. He did no know that he could say more. If he had learnt anything, it was at their disposal; but he would caution anyone listening to him not to be guided by what he had said, because another's experience might be totally different from his, and his experience might possibly be of no help to another. He had no fear of success being secured in the long run.

Mr. Prince asked Mr. M'Lusky if he would tell them where he used the oil. As he had indicated, it was at the top of the Livesey washer.

Mr. M'Lusky said he commenced using blast-furnace "Lucigen" oil on the top of the Livesey washer a year ago last April; putting in about 1½ inches of the oil. But later on, he emptied the last bay of a Holmes mechanical scrubber-washer, and used oil there instead of water; leaving the second bay empty. He got that from Mr. Bell. He had never used oil in a Holmes scrubber-washer until then. Previously he had been content to use it in a Livesey washer. But in June last he put in a Livesey washer, specially on the naphthalene plant, at the meter-outlet. Mr. Bell advised the placing of the apparatus at the meter-outlet because, if put on the scrubber outlet, the purifiers cleaned out the solvent; and it was better they should get it through the station meters, and away to the gasholder.

Mr. Prince said that, for their information upon this topic, which he had very much at heart, he would like to tell them that another friend of his had had the greatest possible success by introducing soft soap into the Livesey washer. It seemed silly, but it had cured his naphthalene trouble. He had not gone the length of trying it himself; but his friend spoke of it with the greatest possible confidence, and he was making somewhere about 300 million cubic feet per annum.

Mr. J. Bond (Southport) thanked them for their invitation to be present. He had had no trouble with naphthalene during the 22 years he had been in the district; but he had made investigations, and found that a certain amount of the naphthalene was dissolved by the oils contained in the ammoniacal liquor. As a great quantity of ammoniacal liquor was used for washing the gas, especially during hot days, when the sun's rays were pouring down on the scrubbers and washers, a large amount of the naphthalene was given up from the liquor. Apart from this, and a few investigations regarding the testing of naphthalene, he had had no experience, as he had not been troubled with it.

Mr. T. Wilson said they were told that if they used coking coal, at a high temperature, they were bound to have naphthalene. They did not use a pound of anything else at Coatbridge; and they had never seen less naphthalene in their mains and plant. It must be very confusing to many Scotch managers who had never seen naphthalene, to hear such statements made. He might tell them it was in Hull that he had his experience with naphthalene. There, whenever their yield rose, they had naphthalene troubles; but so long as they distilled at a low temperature, they were free. It was very curious. He had no doubt that naphthalene existed in the gas at Coatbridge; but it went to the consumers, and his experience of gas making was that it was not always profitable to distil at a high temperature. It was a matter of £ s. d. He found if he extracted 1000 cubic feet more from a ton of coal, he was taking out of it what would go to the tar-well. It was all very well, in England, where they supplied 14-candle gas, to do so; but it was different in Scotland, where they supplied 22 or 24 candle gas.

The President thought they were specially indebted to their English friends for the information they had given them on the naphthalene question. Their experience on the subject was of very much more importance than anything they had yet had in Scotland. In Scotland, they were only at the beginning of their troubles; and, as the lower seams of coal came to be worked, they were bound to have more experience with naphthalene in their gas-works.

Mr. Smith, in closing the discussion, said a minor matter which had come under his observation was the freedom from this scourge where pipes were coated on the inside with some preparation of tar and pitch. It was his experience to note that the greater number of stoppages were in services leading from old and uncoated pipes; and he could well understand that the solvent action of the hydrocarbons in the gas upon the tarry coating would cause flakes of naphthalene to adhere and not fall again into the flowing stream of gas, and their disposition to still cling to the coating would be much greater in the heat of noonday than of similar flakes clinging by capillary attraction to an uncoated pipe. The late Mr. Young's idea was to distil a portion of the coal at a low heat, in order to manufacture a greater quantity of light oily and tarry matter, and then to wash the mixed gases with the light oils suitable for naphthalene extraction. Yet if a like result could be obtained by utilizing automatically the tarry matter naturally found in the crude gas, a great amount of attention and expense would be saved. In his (the speaker's) own case, the results show that there was sufficient oily matter in the crude gas, if properly used, to render the contained naphthalene harmless. He heartily thanked them for the manner in which they had received this his first contribution to the proceedings of the Association.

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In the "Journal" last week (p. 267), it was announced that the Anchor Tube Company had been registered as a limited liability undertaking. We learn that, after many years of faithful service, Mr. John Hicks and Mr. William Jones have been appointed Directors; and the former gentleman will also discharge the duties of Secretary. Mr. Jones, as some of our readers may be aware, is a partner in the firm of Messrs. Thomas Cash, Son, and Co., of Birmingham.

We learn that M. Gustave Canet has been elected President of the Junior Institution of Engineers, in succession to Mr. W. B. Bryan, M.Inst.C.E., the Chief Engineer of the Metropolitan Water Board, and that he will deliver his Inaugural Address on Monday, the 18th of November. M. Canet, as some of our readers may be aware, is connected with the celebrated Schneider-Creuzot ordnance works at Havre. His address will be on "The Latest Improvements in English and French Modern Artillery."

## PHOTOMETER UTILIZING THE COSINE LAW.

At a Recent Meeting of the Physical Society, Mr. J. S. Dow described a form of photometer in which the cosine law is utilized. It is therefore unnecessary to move either the photometer or the sources of light. The adjustment of the illumination of the photometrical surfaces is carried out in the photometer itself by the rotation of a Ritchie wedge about the boundary-line between the photometrical surfaces as axis. The ratio of the candle powers of the two sources of light compared can then be read off on a suitably calibrated scale attached to the photometer. This type of instrument is very convenient; but, according to an abstract of Mr. Dow's communication in the "Chemical News," attention was drawn to the possibility of "angle errors" and means of avoiding them. The instrument could be used on the "equality of brightness" principle, or, by utilizing an oscillating lens, as a flicker photometer. The results of using these two photometrical methods were, in this case, in very good agreement. Yet this might not have been so if a different portion of the retina had been utilized, especially at low illuminations.

An experiment was shown illustrating the behaviour of the "rods" and "cones" as regards flicker. At strong illuminations, when the cones are predominant, the perception of form and colour is most acute when the central portion of the retina is utilized; but at low illuminations, when the rods are in action, visual acuteness is best when the outer region of the retina is used. In the same way the perception of flicker was demonstrated to be only most acute over the portion of the retina removed from the centre of the eye when a weak illumination is employed. A distinction must be drawn between "rod-flicker" and "cone-flicker."

Some experiments were shown illustrating the detail-revealing powers of red and green light. A green or blue surface loses in luminosity as the image of it fades more and more towards the centre of the retina. But apart from the question of luminosity, the red end of the spectrum gives the best definition in the case of distant vision, and the blue end in the case of very close vision, This arises from the want of achromatism of the eye. Two exactly similar patches of red and blue light were thrown upon a screen on which a black and white chess-board pattern had been traced. The black and white squares were then seen to be more sharply defined when illuminated by the red light, in spite of the fact that the illumination due to the blue light was much the brighter of the two. The red end of the spectrum is therefore, in general, the most effectual portion for the illumination of clocks, shop-signs, and objects which must be viewed from a distance.

The author was complimented by Mr. Patterson upon his paper and the experiments shown. With reference to the instrument, he asked if the cosine law was trustworthy at very acute incidence of the light. The unequal sensitiveness of different parts of the retina accounted for the fact that it was possible to obtain different balance-points by fixing attention on the different sides of a Ritchie wedge. Mr. Dow, in reply, said he had only worked with photometers with wedges of 90°; but he was certain that the cosine law would not hold at acute incidence, on account of the large amount of regular reflection.

## APPLICATIONS FOR LETTERS PATENT.

15,635.—Lemétais, J., "Apparatus for heating water." July 8.
15,722.—Hailwood, J., "Mixture of cementing materials to be used in the place of ordinary fire-clay." July 9.
15,766.—Gameson, C. H., "Regenerative furnaces." July 9.
15,776.—Reiss, C., "Inverted gas-lamps." July 9.
15,818.—Greenwood, A., "Pipe-union." July 10.
15,851.—Hallows, H., "Street-lamp post." July 10.
15,871.—Parker, T., "Production of gas from volatile hydrocarbons." July 10.
15,872.—Parker, T., "Manufacture of fuel." July 10.
15,893.—Blaser, F., "Lighting gas from a distance." July 10.
16,024.—Bray, J. W., "Gas-lamp fitting." July 12.
16,069.—Rudd, A., "Incandescent burners." July 12.
16,094.—Broughton, H., "Incandescent burners." July 12.
16,095.—Boys, C. V., "Controlling the movements of fluid-operated pistons." July 12.
16,133.—Hinch, J., and Brooks, B. W., "Anti-vibrator gas-nipple." July 13.
16,155.—Pinchbeck, J., "Gas-meters." July 13.
16,213.—Russell, R. J., "Gas lamps and burners." July 15.
16,262.—Wilson, F. W., "Rotary engine designed for use with steam, gas, or water." July 15.
16,287.—Schneider, J., "Regulating the pressure or degree of vacuum in gasholder bells." July 16.
16,299.—Sauer, P., "Union joints." July 16.
16,303.—Franks, E. A., "Manufacture of coal gas." July 16.
16,342.—Tangyes, Ltd., and Robson, J., jun., "Gas-producers." July 16.
16,343.—Browne, A. F., "Discharging continuously working vertical retorts." July 16.
16,380.—Helps, G., "Incandescent burners." July 17.
16,397.—Haughton, A., "Suction gas-producers." July 17.
16,496.—Garner, W., "Gas cooking-stoves." July 18.
16,583.—Humphrey, H. A., "Firing kilns by gas." July 19.
16,619.—Boys, C. V., "Controlling the movements of fluid-operated pistons." July 19.

# REGISTER OF PATENTS.

### Gas-Fired Pottery Kilns and Ovens.

Twyford, T. W., of Hanley, and Moore, T. C., of Stoke-on-Trent.
No. 18,769; Aug. 22, 1906.

This invention relates to kilns and ovens for burning pottery and performing analogous operations, of the type in which Mond gas or other producer gas is used as the fuel, and a system of gas and air flues or passages are employed for conveying the fuel and atmospheric air as a combustible mixture to the oven or chamber in which the goods to be burnt or fired are contained. The object of the invention is to provide a kiln in which the gas and air flues or passages are arranged in such a manner as "to ensure the utilization of the gas-fuel to its maximum calorific value and of the delivery of the atmospheric air to the combustion chamber in a highly-heated condition, in which it will ensure and promote the perfect combustion of the fuel and the development of a temperature and calorific efficiency which are considerably higher than can be obtained when working with gas fuel in kilns of the ordinary construction."

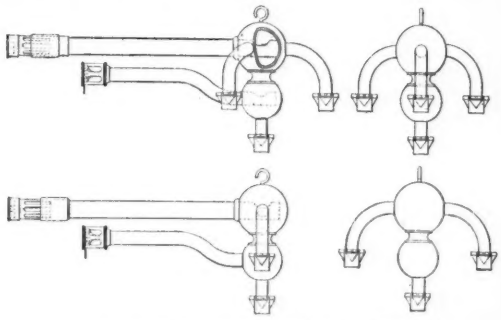
These objects are attained by constructing, within the interior of the oven or firing chamber of the kiln, a plurality of extended or elongated gas and air flues or passages, which communicate with the combustion spaces of the structure and are directly subjected to the heat generated within the oven by the combustion of the mixture of gas and air. Thus part of the heat of the oven is utilized regeneratively for raising the gas fuel and air supplies to a high temperature before they enter the parts of the structure in which they intermingle and are burnt. In this way the complete combustion of the gaseous mixture is said to be ensured, together with the utilization of the fuel to its maximum calorific efficiency and the consequent development of considerably increased temperatures as compared with those obtainable in ordinary gas-fired kilns. Thus the operations which the kiln is designed to perform can be more expeditiously and economically carried out, in addition to which the construction admits of the working of the oven being more easily regulated or controlled.

No less than eight sheets of drawings are required to illustrate the arrangement claimed for the purposes set forth.

### Grouping Arrangement for Inverted Burners.

Morton, F. & C., of Manchester.
No. 22,068; Oct. 6, 1906.

This invention is particularly adapted for use in street and other public lighting where the full light is not always required, as some of the lights can be extinguished without affecting (say) one of the burners, and the heat from one burner is utilized to raise the temperature of the gas before it reaches the other burners of the group. All the burners except one are fed from the same supply pipe, which admits the gas and air into a chamber into which curved branch pipes are fitted—one for each inverted burner. There is a second supply pipe for an additional inverted burner, which is preferably in the centre of, but below, the group of burners, so that when all the burners are lighted the heat from the single bottom burner acting upon the chamber heats it and the mixture of gas and air in it.



**Morton's Inverted Burner Grouping Arrangements.**

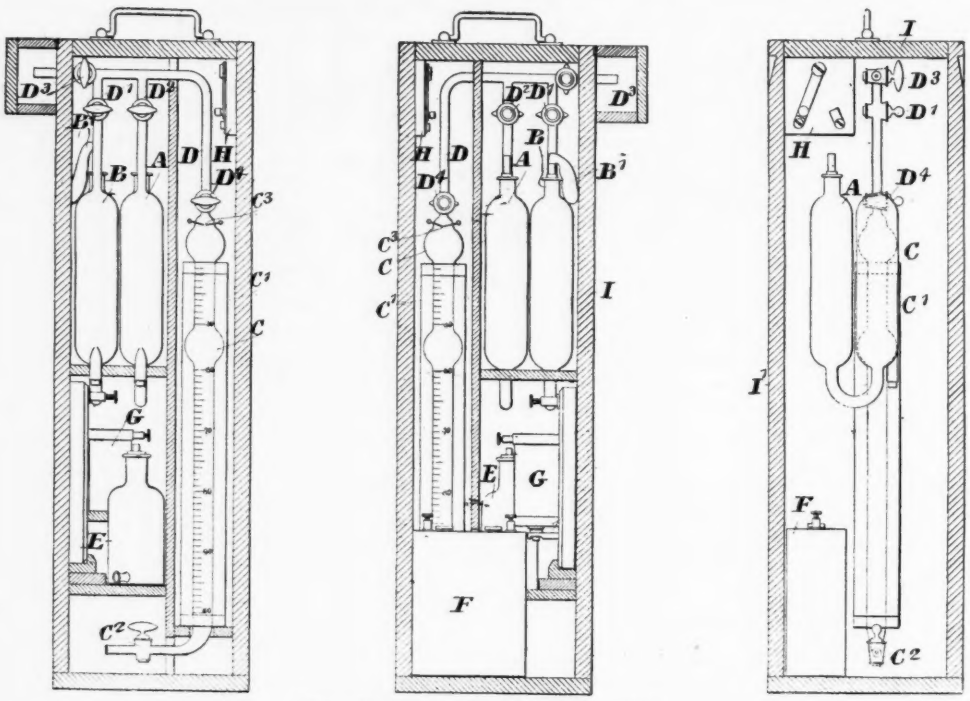
In the first arrangement shown, when all the burners are lighted the heat from the single bottom burner impinging upon the lower globular chamber heats it and the chamber above, and the gaseous mixture they contain is also heated, which "will cause the mixture consumed by all burners to burn with greater heat—thus giving a more brilliant light." Either the group of burners can be turned off by a single tap, or the single burner alone turned off and the group allowed to burn. The second arrangement differs only from the first one in that there are only two (in place of three) burners connected to the upper globular chamber of the main supply pipe.

### Portable Gas-Analysis Apparatus.

South Staffordshire Mond Gas (Power and Heating) Company, and Pinnock, H. T., of Dudley Port.
No. 24,405; Nov. 1, 1906.

This invention relates to apparatus of the Orsat type for the analysis of complex gases such as are employed for power, heating, and lighting purposes.

With the ordinary forms and modifications of the Orsat apparatus, the patentees point out that it is necessary to provide an absorption pipette or tube for each of the constituents to be estimated. The apparatus is, in consequence, bulky. An accurate estimation of methane in gases is, moreover, impossible, for the reason that no reagent capable of absorbing methane is known. Further, the use of heated




Pinnock's Portable Gas-Analysis Apparatus.

palladinized asbestos for the absorption of hydrogen is unsatisfactory, on account not only of the slowness of the operation, but also the frequency with which the tubes containing the preparation break when heated to bring about the required reaction. In apparatus intended for estimating carbon dioxide, carbon monoxide, and hydrogen in, more especially, flue gases, it has been proposed to employ a combustion pipette in conjunction with an absorption pipette and a measuring tube. The latter has also been formed with an enlarged graduated part at its upper end.

The object of the present invention is to construct a compact and convenient portable apparatus by which a complete analysis for the chief constituents of producer, illuminating, and other complex gases can be rapidly performed with sufficient accuracy. The invention comprises essentially the employment, in conjunction with absorption pipettes containing suitable reagents for the gases, of a graduated eudiometer or combined measuring and explosion tube with electrical ignition apparatus, whereby such constituents as carbonic oxide, hydrogen, and methane can be readily exploded with air to form carbon dioxide and water, so that the estimation of the various constituents from the data obtained can be effected.

The illustrations show sectional front, rear, and side elevations of the analysis apparatus referred to.

For the estimation of carbonic oxide, carbon dioxide, methane, hydrogen, oxygen, and nitrogen, a pair of absorption pipettes A and B are made from glass similar in construction to those generally employed in the ordinary forms of gas-analysis apparatus—each pipette consisting of a pair of bulbs connected together by a tube at their lower extremities. One of the pipettes (A) contains a solution of caustic potash or soda for the absorption of carbon dioxide; while the other (B) contains alkaline potassium pyrogallate for the absorption of oxygen. To prevent access of air into the rear member of pipette B, and consequent deterioration of the reagent, a flexible indiarubber sac $B^1$ is provided at the outlet end; the sac being sufficiently thin to readily expand when air is displaced into it during the operation of the apparatus. The rear member of the pipette A is open to the atmosphere.

In conjunction with the pipettes is arranged a graduated eudiometer or combined measuring and explosion tube C, which communicates at its upper end with a main capillary tube D, having tap-controlled capillary branches $D^1$ $D^2$ connected with one of the bulbs of each of the pipettes. The outer end of the main capillary tube D may be provided with means for filtering the gas to be analyzed, and also with a tap $D^3$, by which the supply of gas can be regulated. Immediately above the eudiometer is arranged a three-way tap $D^4$, to put either the main capillary tube D or the eudiometer into communication with the atmosphere, as well as the several parts into communication with each other. The eudiometer is graduated to measure 100 c.c.; but as all the graduations are not utilized in practice—namely, for example, those between 0 and 20, and 30 and 60—the capacity of the tube is enlarged between these limits by the formation of bulbs thereon as shown, with the result that the total length of the tube is considerably reduced. Advantage in portability is thus gained. The whole of the eudiometer is enclosed in a glass tube $C^1$ forming a water jacket, to prevent any heating of the gas and the consequent introduction of errors. At the lower extremity of the eudiometer communication is made by a flexible tube (not shown) with an ordinary water-bottle E, which can be raised or lowered as required for effecting adjustment of the water level in the eudiometer or for entirely displacing the gaseous contents from it. The water in the bottle is preferably acidified slightly to prevent the absorption of carbon dioxide, and is coloured with methyl orange, litmus, or other suitable colouring medium. At the lower extremity of the eudiometer a tap $C^2$ is provided. For producing a spark across the platinum poles $C^3$ of the eudiometer, a secondary battery F and induction coil G are employed; the circuit being controlled by a switch H. The whole of the parts are compactly arranged within a case I (preferably provided with sliding lids $I^1$), so that it can be carried about for performing analyses at any part of a gas distributing main or district.

An analysis of (say) Mond gas, by means of the apparatus, is performed as follows: After the main capillary tube D has been swept clear of air by a current of the gas to be analyzed, the eudiometer C is charged in the ordinary manner with 100 c.c. at the normal pressure of the atmosphere. The gaseous contents of the eudiometer are then displaced (by elevating the water bottle) into the pipette containing caustic potash solution, where the carbon dioxide is absorbed. On lowering the water bottle, the residual gas returns to the eudiometer. The difference between the reading of the water level in the eudiometer taken before and after this absorption gives the volume per cent. of carbon dioxide present in the original gas. For the estimation of oxygen, the gas is displayed from the eudiometer into the pipette containing alkaline pyrogallate and then returned. As the gases to be analyzed do not ordinarily contain free oxygen, the readings taken before and after this operation will usually be identical.

The gas remaining in the eudiometer may contain carbonic oxide, hydrogen, methane, and nitrogen. Before estimating the proportions of these constituents, two-thirds of the volume of the gas is discharged to the atmosphere. Air is then drawn into the eudiometer, and the volume noted. Intimate mixture of the air and gas may be ensured by discharging the whole into the caustic potash pipette and returning it to the eudiometer. After closing the taps at each end of the eudiometer, the contents are exploded. On then opening the bottom tap, and re-adjusting the water level in the eudiometer, the volume of the residual contents is noted. The carbon dioxide and excess of oxygen are then separately absorbed, and the remaining volume measured after each operation. The gas finally left in the eudiometer is nitrogen, which consists of one-third of the nitrogen in the original gas together with the whole of the nitrogen in the added air. As the volume of air introduced prior to the explosion is known, the quantity of nitrogen can be readily ascertained by reference to a suitable table.

If N = residual nitrogen
$N^1$ = nitrogen in added air;
then $3(N - N^1)$ = percentage of nitrogen in the original gas.

To calculate the volumes of methane, hydrogen, and carbonic oxide, let

A = volume of gas taken for explosion
$A^1$ = combined volumes of CO, $CH_4$ and $H_2$
then $A^1 = A - n$ where $n$ is the amount (previously ascertained) of nitrogen in one-third of the original gas.
D = $CO_2$ formed by the explosion.
C = contraction on explosion.
then $3(A^1 - D) = H_2$ per cent. in original volume of gas.
$3A^1 + D - 2C = CO$ ditto.
and $2C + 2D - 3A^1 = CH_4$ ditto.

The formulæ are deduced from the known theoretical relations between the respective volumes of the original gases and the explosion products.

As an example, the following shows the results obtained in an analysis of Mond gas:—

| | Cubic Centimetres. | Per Cent. |
|---|---|---|
| Volume of gas taken | 100 | |
| ,, after absorption by KOH | 82·2 | ∴ $CO_2$ = 17·8 |
| ,, after absorption by pyrogallate | 82·2 | ∴ $O_2$ = 0·0 |
| One-third of last volume | 27·4 | |
| Volume after adding air | 96·2 | |
| ,, after explosion | 78·8 | |
| ,, after absorbing $CO_2$ | 75·0 | |
| ,, after absorbing $O_2$ | 68·6 | |

From the foregoing figures

| | | |
|---|---|---|
| Volume of residual $N_2$ | 68·6 | |
| ,, of air added | 68·8 | |
| ,, of $N_2$ in air added | 54·3 | (by reference to tables) |
| Therefore $N_2$ present in One-third of original gas | 14·3 | whence $N_2 = 42·9$ p.c. |
| Combined volumes of CO, $CH_4$, and $H_2$ in 27·4 c.c. of original gas | 13·1 | = A |
| Contraction | 17·4 | = C |
| $CO_2$ formed by explosion | 3·8 | = D |

Upon substituting these values of $A^1$, C, D, in the above formulæ, it will be found that

$H_2$ = 27·9 per cent.
CO = 8·3 ,,
$CH_4$ = 3·1 ,,

The result of the complete analysis is therefore—

| | |
|---|---|
| $CO_2$ | 17·8 |
| $O_2$ | 0·0 |
| CO | 8·3 |
| $H_2$ | 27·9 |
| $CH_4$ | 3·1 |
| $N_2$ | 42·9 |
| | 100·0 |

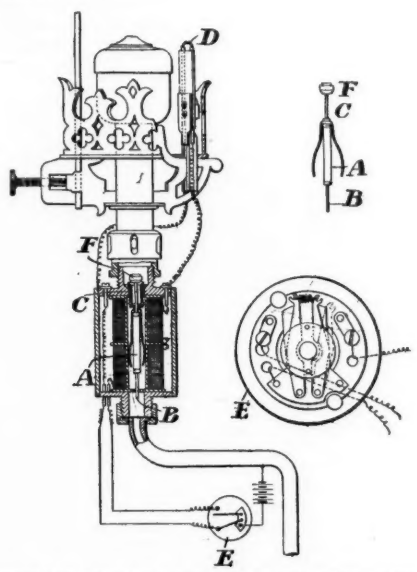
In the case of illuminating gases, a third pipette—containing bromine water or fuming sulphuric acid or other suitable absorbent—is employed for absorbing the olefines and benzenes.

## Lighting and Extinguishing Gas-Burners from a Distance.

Clerc, E., and Bidault, E., of Paris.

No. 134; Jan. 2, 1907. Date claimed under International Convention, Jan. 2, 1906.

This lighting and extinguishing device consists of a two-way switch worked as shown.




**Clerc and Bidault's Lamp Lighter and Extinguisher.**

The bunsen tube of the burner is screwed on a tube intended to admit gas to the mixing-chamber. The tube is provided with a flange connected to a flange made in one piece with a hollow cylinder on which are wound two coils superposed and separated by a flange made integral with the cylinder. The lower flange of the latter carries a plate made integral with a screw-threaded tube intended to be connected to an ordinary gas-duct.

Inside the cylinder carrying the coils, a shuttle or core A, made of soft iron, and provided at its ends with two copper washers, is adapted to reciprocate axially—the core being guided in its motions on the one hand by a rod B secured to it and adapted to slide in an opening arranged in the centre of a cross-piece arranged in the lower opening of the cylinder, and, on the other hand, by means of springs secured by one of their ends to the core, and intended to keep the core in any position into which it may have been moved, as hereafter described.

The core carries at the end opposed to that whereto the rod B is secured, another rod C, provided with a valve F, which (according to the position of the core) closes the passage of the gas or allows it to reach the burner when light is required.

The igniter (arranged upon the burner) comprises a platinum wire D mounted on two rods made of silver or any other metal, and insulated from each other. They are protected from the flame of the bunsen burner by a mica plate connected by an insulating support made of fibre, through which the rods pass and which is carried by a clip secured to one of the arms of the burner-gallery. The platinum wire is arranged at the level of the burner-mouth, and inside the mantle, when applied to an incandescent burner.

The electric current is conveyed to the igniter by two supple wires connected to the rods by points penetrating into holes formed in the lower ends of the rods. The electrical circuit intended to produce the lighting or extinction (the current may come from any source of supply) is diagrammatically shown.

The current, owing to a two-way switch E arranged on the conductor coming from the battery, arrives at the lamp by one or other terminal. The two-way switch, which is the characteristic feature of the invention, comprises two arms, each of which is movable on a pivot situated at one of its ends. These arms have at their opposite ends hooks receiving a coiled spring connecting the ends, and which has a tendency to draw the two arms to the centre of the switch. A pin mounted on the switch-base stops each arm in the direction opposite to that in which it acts. The actuating button of the switch is mounted free in the centre of the latter, and carries a pin which pushes one of the arms in the direction it is intended to give to the current. This arm impinges against a contact which leads the current to the lighting and extinguishing device. After each manipulation, the button is carried back into its inoperative position by the arm itself under the action of the coil spring.

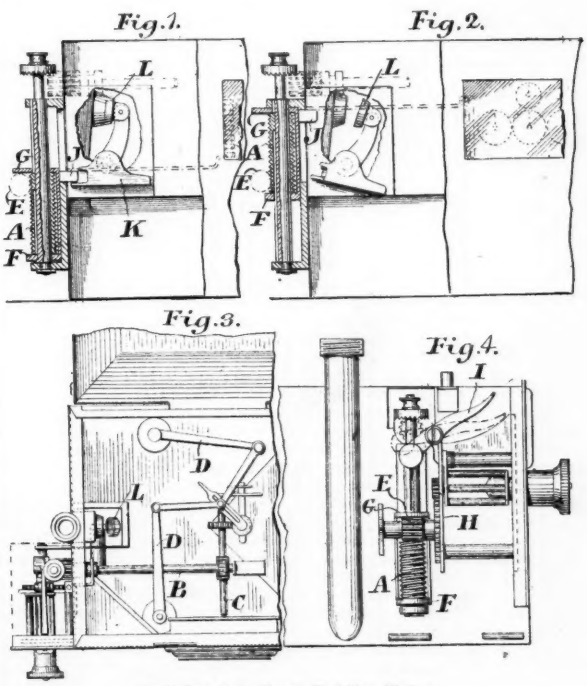
When it is desired to light the burner, the current causes the platinum wire to glow and acts upon the upper coil, which, by attraction, causes the core to rise. It follows therefrom that the valve F leaves its seat and allows the passage of the gas, which, after having been mixed with air in the bunsen burner, is lighted at the igniter. When it is desired to extinguish the burner, the current is made to pass through the lower solenoid; and the core is attracted towards the bottom and carries with it the valve F, which cuts off the admission of the gas to the bunsen burner and thereby extinguishes it.

## Coin-Controlled Gas-Meters.

Cuttell, T. L., and the Anti-Vibration Incandescent Lighting Company, Limited, of Otley.

No. 4483; Feb. 23, 1907.

This invention refers to coin-controlled gas-meters in which there is a worm mounted upon, and engaging, a revoluble shaft by a feather and groove, so that at one time the worm can be traversed along the shaft without revolving, by means of a toothed wheel engaging the thread of the worm, which serves at that time as a rack—the toothed wheel being revolved through a definite distance by the aid of an inserted coin; while, on the other hand, the worm-shaft is returned to position by being revolved by mechanism receiving motion from the meter-measuring apparatus, the toothed wheel (then stationary) acting as a nut. The traversing movement of the worm upon its shaft operates the gas-inlet valve to the meter; while in some cases the traversing movement of the worm is also utilized to close the coin-shoot, to prevent the entry of coins when the worm has reached the extent of its motion, and to indicate the number of coins inserted.




**Cuttell's Coin-Controlled Gas-Meter.**

Fig. 1 is a sectional front elevation showing the gas-valve closed and the worm in its lowest position. Fig. 2 is a similar view showing the gas-valve open and the worm in its high position. Fig. 3 is a plan view with the cover removed. Fig. 4 is a side elevation with the cover of the coin mechanism removed and illustrating the slot-closing balanced lever, the worm, its carriage, and the coin-cage.

The worm A is mounted, as usual, upon a vertical revoluble spindle, which it engages by a groove and feather, so that the worm can be slid in the direction of the axis of the shaft and at the same time can be revolved with the shaft. At the upper end of the shaft is a crown-wheel gearing with a pinion on a shaft B, which carries a worm-wheel engaging a worm on a shaft C, which is revolved by a worm on a vertical shaft receiving motion from arms and links D, operated by the moving parts of the meter. Thus, as the gas is delivered, the worm A, engaging a then stationary toothed wheel E, is slowly traversed down the shaft to its lowest position.

There is a worm and carriage having lower and upper arms F G, of such a form that the shaft of worm A passes freely through these arms,

while the upper and lower ends of the worm bear upon the surfaces of the arms; and so the carriage is traversed along with the worm. Such a carriage is formed with the upper arm G projecting away from the shaft; and upon a stationary frame H is pivoted a counter-balanced lever I, so that its lighter end can be moved to come in front of the coin slot and prevent the entrance of a coin. The position of the extension of the upper arm of the worm carriage relatively to the lever I is such that, when the carriage is about reaching its uppermost position, it tilts the lever against the action of the counterbalance weight and causes its opposite end to prevent the entrance of a coin by the slot; while when the worm is lowered (and with it the carriage), the lever is freed and the counterweight tilts the lever and frees the coin slot. This construction and arrangement of parts, it is said, provides "a very simple and particularly reliable means for preventing the entrance of a coin at improper times."

Beyond this, the rear vertical face of the worm carriage is formed at its upper part with a projection J entering a slot in the casing of the meter, and of such length that, when the worm is in its lower position, the projection passes into the forked end of a rocker K fixed on the axis of an arm which carries a valve L controlling the gas-inlet passage. The fork of the rocker is so fashioned that, when the worm carriage commences its upward movement from the position shown in fig. 1, its projection J will positively act on the upper member of the fork of the rocker and start the opening of the valve, and then the projection, during its further upward movement, passes away from the fork (as shown at fig. 2). Thus the first movement of the valve will not depend merely upon the fact that the end of the rocker opposite to the fork is of greater weight; and so the opening of the valve is commenced by a definite mechanical action, and its further opening is effected by the counterbalancing action of the rocker.

From the worm carriage there proceeds an arm (shown by dotted lines), which indicates upon an index, as usual, the number of coins that have been inserted.

The stationary frame H carries a horizontal revoluble cage, the distance apart of its two end plates (which carry the bars) being sufficient to allow the coin of the predetermined size to enter; and passing through a tubular outer bearing of the cage is a spindle having on its inner end, and protruding within the cage, a stud, which is formed with a slot, so that, upon the coin being inserted in the coin-slot, it is guided and falls between the bars of the cage and enters a slot in the stud, so that the coin is held between the stud and the opposite end of the cage. The stud spindle carries exteriorly an operating knob capable of being rotated, so that, the coin being in the position stated, the knob can be turned through the limited distance allowed, and the coin engaging the bars of the cage give the same angular rotation to the cage, and then the coin is free to fall into the box. As the gas is used and the measuring mechanism operates the shaft B, the worm will descend from the position shown at fig. 2, allow the lever I to move by gravity away from the coin-slot, and finally the projection J of the worm carriage will engage the fork of the rocker and mechanically close the inlet valve.

## Igniting Gaseous Mixtures by Electric Sparks.

MARKS, E. C. R.; a communication from Aktiengesellschaft für Automatische Zund und Losch Apparate, of Zurich, Switzerland.

No. 1201; Jan. 16, 1907.

This invention has for its object to ensure ignition by constantly altering the course of the sparks, or the size or shape of the gas current, so that the igniting sparks will always pierce through the combustible layer of an air and gas mixture.

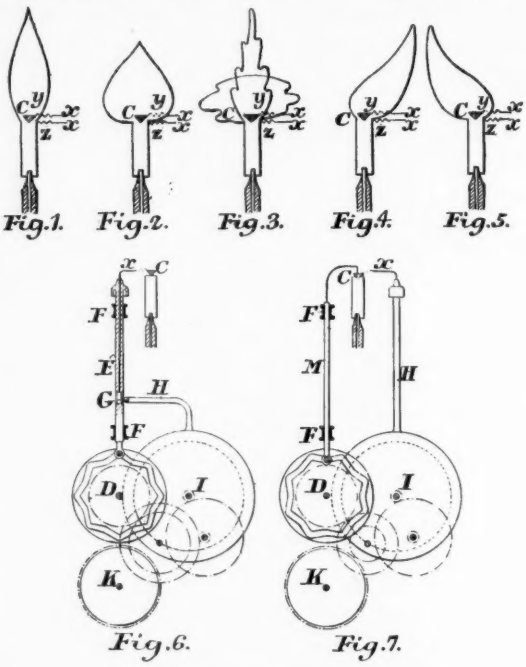
It is well known, the patentees remark, that the gas escaping from a burner cannot be ignited by electric sparks if the electric discharge takes place wholly within the gas current. This may be partly due to the fact that the slightly increased conductivity of the gas will offer less resistance to the sparks than pure air, and therefore the temperature necessary for ignition is not reached; and so it happens that the sparks produced with the same apparatus appear white-hot and strong in pure air, and in a gas-current red hot and weak. On the other hand, an ignition will always be effected if the sparks pass from the atmosphere through the zone of ignition into the gas current—the zone of ignition comprising the outer layers of the current of gas, which, together with the surrounding atmospheric air, give a combustible mixture of gas and air. Furthermore, from the fact that white and strong sparks jumping from the atmosphere into the current of gas appear red and weak after passing the zone of ignition, it also follows that the temperature of the sparks is greatest in the zone of ignition, and that ignition is here most likely to happen.

The modes described for carrying out the invention refer to the automatic ignition of gas-flames in street-lamps by means of electric sparks at certain periods produced by the induction machine. For this mode of application to incandescent burners, the igniting flame must be extinguished after the principal flame is lit. It must be at least 60 to 80 mm. long, and from 6 to 8 mm. thick, so that it will remove the cold air from the glass chimney of the principal burner before the ignition takes place—thus preventing an explosion or flashing-back of the flame. So great a length of the igniting flame, however, causes the gas current to be particularly affected by outer influences, thus tending to alter the position of the zone of ignition.

In figs. 1 to 5, some examples of the effects of these influences are given. Fig. 1 shows the shape of the current of the gas at normal pressure, without any external influences. Fig. 2 shows the same current of gas at an insufficient pressure. Fig. 3 shows the current distributed by vibration of the atmosphere due to a sound, an explosion, or the like. Figs. 4 and 5 show a gas stream impinged upon by an air current.

Supposing that provision has been made either so that the ignition sparks will follow the course $x$—$y$, or that they will move in the direction $x$—$z$, then, according to the examples of figs. 2 and 4, the course of the sparks $x$—$y$, and in figs. 1 and 5 the course $x$—$z$, will have no effect. In fig. 3, with a depressed current of gas the course $x$—$y$, and with an elongated current the distance $x$—$z$ will be ineffective. Therefore neither the course $x$—$y$ nor the course $x$—$z$ will alone give sufficient guarantee for a never-failing ignition. If, however, the point of issue of the ignition sparks—for instance, the point $x$—is made movable in such a manner that the sparks will alternately jump to $y$ and $z$, some of them will not miss the zone of ignition, and consequently will always cause an ignition.

The same effect may also be obtained by regularly altering the direction of the gas current—for instance, by moving the distributing cone up and down; since then also the zone of ignition is sure to be struck by the ignition sparks. A like result is obtained if the course of the sparks $x\,y$ or $x\,z$ were extended beyond the extreme limits of the gas current. This, however, is not correct, since under the present circumstances, a distance between the tops exceeding 4 mm. is not permissible; for in the first place the power of an expanded spring used for driving the inductive machine and the means for cutting off the gas is very limited, since there is very little space available for arranging the spring and the clockwork releasing it at certain periods in order to have as little shadow as possible, and since the period for running the clockwork (on account of the winding to be effected, together with the cleaning of the lamp) must not be less than fourteen days. On the other hand, a great amount of the driving force must be used for saturating the electric sparks (increasing their energy with a given spark length), so that with each ignition the inductive machine must be working for at least ten or twelve seconds. It has been found from




**A Zurich Electric Gas Lighter.**

experience that for ignition purposes only sparks saturated up to 100 per cent.—that is, sparks, the energy of which has reached a maximum with a given spark length—are to be used. Therefore saturated sparks which are only 4 mm. long must be produced from sparks of 8 mm. length, which are weak, by means of a condenser, in which case the strength of the driving spring best adapted for the present purpose will be just sufficient. Finally, it must be remembered that, with a greater distance between the points, the tension of the current will be increased accordingly, and that then, with more than 80 per cent. of moisture in the air, the leakage will become very great, whereby the number of the sparks passing over per unit of time is decreased considerably, which will then again make an ignition doubtful.

A movement of the point of issue $x$ of the sparks, or of the distributing cone C, may (for instance) be effected by a cam D (compare figs. 6 and 7), which, in the same manner as the induction machine I, is rotated by a driving spring K periodically released by clockwork. In the former case (fig. 6), the cam disc D moves an insulated rod E, provided with the discharging point $x$, and connected with the insulated wire H by the sliding contact G; and in the latter case (fig. 7), the disc reciprocates a rod M, which is not insulated and which carries the distributing cone C in guides F, to and fro or up and down.

# CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

## Capital Expenditure of Gas Companies and Local Authorities.

SIR,—I am unable to follow you in your exclusion of such Companies as the Gaslight and Coke, South Metropolitan, and Commercial, while retaining on the other side such undertakings as those of Birmingham and Glasgow; nor is it easy to see how this can help you. It is true the capital expenditure of these Companies has been less than the average of all the companies by about £64 per million cubic feet sold; but their exclusion increases the average of the remaining companies from £499 to £527 per million cubic feet sold. Moreover, if the London Companies be taken by themselves, it will be found that their average capital expenditure has been more than double the increased capital indebtedness of the local authorities, which it exceeds by about £247

per million cubic feet sold. It is clear from this that size is by no means a predominating factor in this connection.

Will you allow me to repeat the figures upon which I take my stand? The Board of Trade Returns show that between the years 1882 and 1905 the local authorities included in both returns reduced their average capital indebtedness from £712 to £401 per million cubic feet sold, while during the same period the companies also included in both returns increased their nominal indebtedness from £731 to £840 per million cubic feet sold. Deducting the amounts added by conversion of stock, the capital outlay of the companies works out at the rate of £499 per million cubic feet sold, which compares with an additional capital indebtedness of the local authorities of only £188. These figures can neither be explained away nor controverted; and they should, as already pointed out, be a warning to the companies to keep down their capital expenditure as much as possible, consistent with increase of business.

15, *Victoria Street, S.W., July* 25, 1907. CHAS. HUNT.

[Mr. Hunt repeats his warning to gas companies, and quotes certain figures, regarding capital expenditure; but we are not disposed to let him escape the sole point that raised this correspondence—that it is unfair, before any body of men inexpert in gas finance, to quote the average figures as to capital per million cubic feet of the local authorities and gas companies mentioned in the Board of Trade returns without fully explaining certain conditions that tend to the widening of the difference between them. In last week's issue, we gave Mr. Hunt a further opening for discussing this point, on his statement in the same issue "that there is but little difference in size between the two classes of undertakings which are thus compared, if measured by average consumption." The 148 local authority undertakings in the 1882 returns are all provincial; we therefore excluded the Metropolitan Companies whose positions are unique, and compared the 148 provincial local authorities with the 348 provincial companies, showing conclusively that there was, in 1882, as there is now, a large preponderance of small provincial companies over the local authority undertakings, the capital expenditure of which small company undertakings must go to swell largely the average capital expenditure per million cubic feet of the companies. Mr. Hunt does not say that this point was not proved by us. He only submits that he is (most gas engineers will not be troubled by the same difficulty) unable to follow us in the exclusion of the three Metropolitan Companies while retaining on the other side Birmingham and Glasgow. The obvious reply to this is that we did not exclude any of the large provincial gas company concerns, such as Liverpool and Sheffield. However, we are in a position now to advance further figures on this point as to incongruity of size, if Mr. Hunt is still dissatisfied with those submitted last week; but we think they have shown him the point, though he is unwilling to admit it. We made a suggestion to our correspondent by which the capital history of 148 local authority undertakings and a similar number of company undertakings (in the returns for 1882) of approximately equal capacity could be compared, but he does not evince any alacrity in entering upon the exercise.—ED. J. G. L.]

## North British Association—Commercial Section.

SIR,—In your issue of next week, I hope you will be able to give us a clear leading with reference to this subject. I appreciate to the full the benefits of frequent intercourse with my neighbours, to compare notes as to prices and things of common interest. I am not one who immures himself within his own works; I like to make a weekly visit to some neighbour for this purpose.

Some time ago ten or a dozen like-minded gas managers in the West of Scotland used to have a regular meeting day once a month at a common meeting-house in Glasgow, when we compared notes and entertained ourselves in a modest way at our own charges. But the "trader" soon scented us out, and the pilgrimage degenerated into bowls or billiards. Some recollection of that experience was at the back of my mind in my remarks last Thursday.

The sale of coke I think to be the only thing in which the provincial gas manager can be helped. In this matter, we are entirely at the mercy of Glasgow. The price of Glasgow coke, *plus* the carriage, is the best price that any gas-works in the West of Scotland can obtain. You will see, if this is correct, that we are entirely in the hands of Glasgow in the sale of coke.

I hope these few remarks will give you a light in what you have to say regarding this Commercial Section. To put the matter plainer, if Glasgow associates with the Commercial Section, the Committee may do some good work; but if Glasgow stands off, the meetings will be in vain and fruitful of no good.

*Saltcoats, July* 27, 1907. J. NAPIER MYERS.

[We do not appreciate the necessity for further discussing the question of Commercial Sections. They have without doubt proved their utility; and we cannot countenance any suggestion of work of proved value being discouraged because there are a few men who take advantage of the opportunities afforded by the prosecution of that work to carouse. Such men will always find opportunities. Just as reasonable would it be to suggest that all the excellent work of our technical societies should be abandoned on precisely the same ground. We are ever for the maintenance of a high standard of usefulness and conduct; but we cannot align ourselves with those who suggest that utility and good shall be hustled on one side by something less virtuous. The general subject of Commercial Sections has been referred to in our editorial columns on various occasions; and matter of a guiding nature will be found in the "JOURNAL" for Sept. 9 and 16, 1902, March 1, 1904, and Sept. 19 and 26, 1905.—ED. J.G.L.]

## Distribution of Gas at Increased Pressure.

SIR,—I fear the "Student" whose letter on the above subject appears in the current number of the "JOURNAL" will be plucked for short-sightedness if he ever sits for an examination. The reply to the question by which he was floored is, of course, that I do not live in the district of the Company with which I am associated as Engineer.

*South Metropolitan Gas Company, July* 24, 1907. CHARLES CARPENTER.

# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills Royal Assented: Brighouse Corporation Bill, Bude Gas Bill, Devonport Corporation Bill, Gas and Water Orders Confirmation Bill (No. 1), Great Yarmouth Water-Works and Lowestoft Water and Gas Bill, Heywood and Middleton Water Board Bill, King's Norton and Northfield Urban District Council Bill, Leeds Corporation Bill, Penrith Urban District Council Bill, Pontypridd Urban District Council Bill, Southend Water Bill, Southport, Birkdale, and West Lancashire Water Board Bill, Tees Valley Water (Consolidation) Bill, Wisbech Water Bill, Worthing Gas Bill.

## HOUSE OF COMMONS.

### Monday, July 22.

### THE GASLIGHT AND COKE COMPANY AND METER-RENTS.

Mr. THORNE asked the President of the Board of Trade whether he was aware that the Public Control Committee of the London County Council had given permission to the Gaslight and Coke Company to reimpose meter-rents, at a cost to the consumers of London of about £60,000 per annum; and whether, in view of the pledge given by the Company that meter-rents, which had been abolished in 1895, should not be reimposed, he intended taking any action in the matter.

Mr. LLOYD-GEORGE: I understand that the London County Council have acquiesced in the proposal of the Gaslight and Coke Company to modify the understanding made with the Council in 1903, so as to permit them to reimpose meter-rents (which were discontinued in 1895), at an estimated cost to consumers of about £60,000 per annum, in lieu of raising the price of gas. This has been done subject to the Company giving an undertaking that the authorized dividend shall in future be calculated as if the price of their gas were 1d. per 1000 cubic feet higher than that actually charged; that the price of gas to the Company's ordinary consumers north of the Thames will not be increased beyond the present price of 2s. 11d. per 1000 cubic feet for a period of one year; and that the annual meter charge for a three-light meter shall not exceed 1s. 8d. per annum. The Company appear to be acting within their statutory powers; and the Board of Trade do not seem to have any authority to intervene. I understand that the Public Control Committee of the London County Council were influenced in their recommendation by the fact that the poorer class of consumers who use automatic meters will not be affected by the change.

### Tuesday, July 23.

### METROPOLITAN WATER BOARD (CHARGES, &c.) BILL.

On the order for the consideration of the Bill as amended (see *ante*, p. 46),

Sir F. BANBURY moved, as an amendment, the recommittal of the Bill to a Private Bill Committee, on the ground that, having been only before one Joint Committee of both Houses, the evidence of consumers and traders did not receive the consideration it should have had, and would have had if, in the ordinary course, it had gone through a Private Bill Committee in each House. A large increase in the charges for water would be imposed on consumers by the Bill—£100,000 additional in the City alone. In the interest of the smaller consumers especially he made his proposition. If there was a deficit on the Water Board's administration, it should be met by a rate levied over the entire London area.

Sir W. BULL seconded the amendment.

Mr. WATERLOW said the object of the Bill was the equalization of water charges in the County of London. As a matter of fact, it would create a fresh inequality between the areas inside and outside that of the London County Council.

Mr. BURNS said the amendment, if carried, would unquestionably kill the Bill for the year, and the large expenses of promotion would have to be incurred again. Uniformity could only be secured by raising some and reducing other charges; and the Water Board were only carrying out the duty imposed upon them by Parliament. The Water Board were under parliamentary constraint to come with the Bill, which had been thirteen days before a Joint Committee. The Committee were unanimous in passing the Bill; and since then substantial concessions had been made to the trade and manufacturing interests. The Board would meet reasonable demands; and he hoped London would not be exposed to the inconvenience of having the settlement of this question again delayed.

Mr. LONG supported the position taken by the President of the Local Government Board. Any solution of this question of the equalization of charges must, he said, cause dissatisfaction in some direction; and no reconsideration would improve the proposals of the present Bill.

After some further remarks, the amendment was lost, on a division, by 53 to 163.

Mr. FLETCHER moved the insertion of the following clause: "Notwithstanding anything in this Act contained, the water-rates shall continue to be payable according to the annual value of the house or building, or part of a house or building, supplied with water by the Board; and such annual value shall, except within the unions and parishes to which the Valuation (Metropolis) Act, 1869, extends, be determined in accordance with the provisions of section 68 of the Water-Works Clauses Act, 1847, and shall in no case be less than the rateable value according to the poor-rate valuations."

Mr. W. F. D. SMITH, in seconding the amendment, said that to pass this Bill before the Valuation Bill promised for next year was to put the cart before the horse.

Lord R. CECIL said this was a measure of enormous importance, and the House was asked to discuss it after midnight, under circumstances when it was impossible to give it proper consideration. He moved the adjournment of the debate.

Mr. F. E. SMITH seconded the motion.

Mr. BURNS hoped the motion would not be pressed, as the substance of the Bill had been decided. If the debate were adjourned, it would mean considering the Bill at an even later hour some future day.

On a division, the motion was lost by a majority of 65.

Mr. DICKINSON expressed approval of the new clause, and called attention to the fact that it was supported by the London members on both sides of the House.

After further debate,

Mr. BURNS opposed the amendment, and eventually it was rejected by a majority of 37.

Mr. COOPER moved an amendment to transfer from the consumers to the Water Board the cost of laying and maintaining communication-pipes.

Mr. BURNS pointed out that at present the Board could not afford to undertake this additional charge.

Sir W. BULL moved the adjournment of the debate, on the ground that a short conference between the contending parties would lead to a settlement between them of the remaining points of difference.

Mr. WATERLOW seconded the motion; and, it being 2.30 a.m., it was carried.

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The following further progress has been made with Bills:—

Lords Bill read a second time and committed: Gas and Water Orders Confirmation Bill (No. 2).

Lords Bills reported: Birkenhead Corporation Water Bill, Broadstairs and St. Peter's Urban District Water Bill, Colne Valley Water Bill, Portishead District Water Bill.

Lords Bills read the third time and passed: Coventry Corporation Water Bill, Sheffield Corporation Bill, Tynemouth Corporation (Water) Bill.

## COLNE VALLEY WATER BILL.

### House of Commons Committee.—Monday, July 22.

(*Before Mr.* ARTHUR STANLEY, *Chairman, Mr.* GOOCH, *Mr.* PEARSON, *and Mr.* HAWORTH.)

The object of this Bill is to confer further powers on the Colne Valley Water Company for the raising of capital and other purposes.

Mr. HONORATUS LLOYD, K.C., and Mr. SYDNEY HOLLAND appeared for the promoters; Mr. BALFOUR BROWNE, K.C., and Mr. C. C. HUTCHINSON represented the Hertfordshire County Council, who were petitioners against the Bill.

Mr. HONORATUS LLOYD, in opening the case on behalf of the promoters, said the Company were incorporated by an Act of Parliament passed in 1873. By the Act they were given statutory power to supply water; the limits of the district then being the parishes of Bushey, Aldenham, and Elstree, in Hertfordshire, and the parishes of Stanmore, Edgware, Pinner, Harrow-on-the-Hill, Kingsbury, and part of Hendon in the County of Middlesex. They were also authorized to sink a well, to erect a pumping-station at Bushey, and to acquire by agreement a quantity of land not exceeding five acres. The water went through Clark's softening process; and the Company had at all times given an excellent supply of very good quality. In 1885, the Company were authorized to purchase the Harrow Water Company's undertaking; and the limits of the Company were extended so as to include the parish of Harrow. Under this Act the Company were also authorized to acquire, by agreement, an area of land not exceeding 20 acres. In 1894, another Act was passed (the Central Middlesex Water Act), which authorized the Central Middlesex Water Company to transfer to the Colne Valley Company that part of their undertaking which was in the parish of Aldenham and Sudbury. In order to provide for the increasing requirements, they had set about sinking a well, called the Eastbury Pumping-Station. This was being done upon land acquired by agreement under the 1885 Act. The area was one acre. Already a very large sum of money had been spent upon this pumping-station. The well had been sunk to a depth of some 165 feet, but was not yet completed. There was power to go deeper; and they must do so in order to get the necessary water. The Company in their early days had great difficulty in raising money; and for some years no dividend was paid. After this, a small one began to be paid; and as the district increased, it went on until eventually a dividend at the rate of 9½ per cent. was paid—the average from 1873 to the present time coming out at 3¼ to 3½ per cent. In latter years, when the success of the Company became assured, the auction clauses also came into play, with the result that a good deal of capital was raised at very substantial premiums. These premiums had gone into the capital account of the Company, but bore no dividend whatever. The Directors had received no fees for twenty years. After this they were voted, he thought, £50 a year each. This had been increased more recently. The time had now come when the capital of the Company was practically exhausted. He thought there was some £12,000, which was now being issued. By clause 4 of the present Bill they sought power to raise £240,000 as share capital, and by clause 14 one-fourth of this sum (£60,000) by way of borrowing powers—making £300,000 in all. This would enable the Company to carry on their undertaking without going to Parliament again for a period of some fourteen years. When the Bill came before the other House, it was opposed by the Middlesex County Council and by eight local authorities. He thought the main ground of their opposition was that the authorized charges of the Company were too high; that they varied in different parts of the district; and that they ought to be reduced. The varying charges were accounted for by the fact that the Company had subsequently acquired the Harrow Company and a portion of the Central Middlesex Company's undertaking; the Colne Valley Company having one set of charges, the Harrow Company's undertaking another, and the Central Middlesex Company a third set. When the Company were before the House of Lords' Committee, having to face the Middlesex County Council and the eight local authorities mentioned, the result was that terms were arranged that were quite satisfactory to all. A number of clauses were inserted in the Bill after these negotiations in order to give the protection which the local authorities and the County Council desired. The result was a very serious one indeed to the Company, because the provisions mainly were that from Jan. 1, 1909, some alterations and reductions of the charges were to be made which would result in the Company's income being reduced by £3400 a year. Then, again, at the end of December, 1913, a further reduction was to take place, which would have the effect of reducing the Company's income by £1600 a year. When the two reductions came into play, the Company's income would be reduced by no less than £5000 a year. Their then opponents were satisfied; and the eight local authorities and the Middlesex County Council having the assurance that these provisions would be made in the Bill, and seeing the clauses that were inserted, went away perfectly satisfied; and the Bill was passed. Now they were met with another petition—that of the Hertfordshire County Council. They did not petition in the first House at all. Counsel having dealt with this petition, pointed out that, by clause 29 of the Bill, which had been agreed with the Middlesex County Council, provision had been made that the supply should be at the fixed rate of 9d., and that it should include the purposes mentioned in section 37 of the Act of 1847—"For the supply of water to all court-houses and public elementary schools within the limits of supply." So far as the Hertfordshire County Council were concerned, the Company had not the least objection to giving them exactly what had been given to the Middlesex Council.

Mr. BALFOUR BROWNE said if the promoters were going to put in a clause that they were not going to give a supply of water, but would make a guarantee that the Hertfordshire County Council would get a supply of water at that rate, he would be satisfied.

Mr. HONORATUS LLOYD promised to consider the question. At the moment all he desired to say was that section 37 was—"in all the pipes to which any fire-plug shall be fixed, the undertakers shall provide and keep constantly laid on unless prevented by frost, unusual drought, or other unavoidable accidents, or during necessary repairs." This was the obligation he was now under; and the difference was that, in this section, it was to be at a price to be agreed, or, failing agreement, to be settled by the Justices. Now they agreed the price at once.

Mr. BALFOUR BROWNE: For my purposes, it is compellable under the General Act. If you make it compellable to the purposes in the case of court-houses and other things, and give me it at 9d., I am satisfied.

Mr. HONORATUS LLOYD: I have no objection to that at all.

The CHAIRMAN: It is compellable in the case of clause 29 for the Middlesex County Council.

Mr. HONORATUS LLOYD: If my friend thinks it is not sufficient, I will make it sufficient.

Mr. BALFOUR BROWNE pointed out that he did not want to prevent the Company completing any works they had begun.

After a short adjournment, Mr. BALFOUR BROWNE said that they had practically agreed clauses, which would not only satisfy the Hertfordshire County Council but the Commissioner of Works also. One was with regard to the mains in the streets (3 feet below), and the other dealt with the supply to elementary schools and court-houses at 9d., which they had bound themselves to do. The first was the most important clause, because it was the one which was also petitioned against, or mentioned, by the Commissioner of Works. There was to be added to clause 33 of the Bill, as a substantive clause, the following:

> The Company shall not, after the passing of this Act, sink any new well upon, or construct any works for taking or intercepting water from, any lands unless such works and lands are specified in an Act of Parliament. But the provisions of this section shall not apply to the completion of the wells and works at Bushey or Eastbury.

The petitioners thought, and he (Mr. Balfour Browne) was glad to say the Commissioner of Works thought, that it was a strong thing to say that, when the Company had begun the Eastbury Well, they should not be allowed to complete it. He was informed that the Company had also started certain works at Bushey; and if they had begun them, the petitioners thought the Company should be allowed to complete them too. Therefore the restriction would be that they should not use any new work, or anything else which was to take away water from Hertfordshire, unless Parliament sanctioned it.

The CHAIRMAN said the Committee were of opinion that the preamble was proved; and the clauses having been adjusted, the Bill was ordered to be reported.

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**Water Gas at Wigan.**—The Wigan Gas Committee have adopted a report of a Sub-Committee appointed to consider tenders for a carburetted water-gas plant and to visit other towns where such installations are in operation, and have decided to accept the tender of the Economical Gas Apparatus Construction Company, Limited, for the erection of a plant.

# LEGAL INTELLIGENCE.

## HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

**Friday, July 26.**

(*Before Justices* BRAY *and* A. T. LAWRENCE.)

### The King v. Justices of the County of London (ex parte the South Metropolitan Gas Company).

This was a motion against a rule calling upon the Justices to show cause why a writ of *certiorari* should not issue to remove a judgment of the Court of Quarter Sessions for the County of London into the High Court on an appeal by the South Metropolitan Gas Company against their assessment in various districts represented by the different Assessment Committees.*

Mr. HORACE AVORY, K.C., and Mr. TERRELL PAINE appeared for the Justices of the County of London; Mr. CRIPPS, K.C., Mr. HORACE AVORY, K.C., and Mr. COX-SINCLAIR for the Woolwich Assessment Committee; Mr. AVORY and Mr. HARPER for the Bermondsey Assessment Committee; Sir RALPH LITTLER, K.C., and Mr. MARSHALL, K.C., for the Greenwich Assessment Committee; and Mr. DANCKWERTS, K.C., and Mr. RYDE represented the Gas Company.

Mr. HORACE AVORY, in support of the motion, said the only ground upon which the rule was obtained was that one of the Justices who formed the Court was disqualified through interest, and (or) possibility of bias. To put it in a word, the allegation was based on a statement that Mr. Willoughby, who was one of the Justices forming the Court, was the Chairman of the Holborn Assessment Committee, who were not a party to the appeal, and the Gas Company had no property in that district whatever.

Justice BRAY asked for the passages in the affidavit on which the rule was obtained.

Mr. HORACE AVORY said it was the affidavit of Sir George Livesey, which stated the bald facts that the appeal was heard for seven days, and on the last day a unanimous judgment was given by the Court dismissing all the appeals with costs; and that it was not until March 2—the third day of the hearing—that it came to his notice, or to the knowledge of any of the officials, that Mr. Willoughby was the Chairman of a London Assessment Committee. It was not disputed that they learned this on the third day of the hearing; and it was not suggested that, when the fact came to their knowledge, they made any objection to it at all. So that, on the authority of many cases, if there was any ground for this objection, it was waived, as they continued to conduct the appeal before Mr. Willoughby. The objection was not taken until after judgment had been given against them. A party who had an objection of this kind was not entitled to sit by and take the chance of getting a judgment in his favour, and then, when it was against him, raise an objection. But he wished to deal with the matter on broader grounds. His submission was that there was no reason for suggesting any interest, or even possibility of bias—which was not sufficient, by-the-by—on the part of Mr. Willoughby, who was Chairman of an Assessment Committee in some other part of London. What it really amounted to was that because the gentleman was Chairman of an Assessment Committee, he was a person likely to know something about the business being discussed before him. "From inquiries I have since caused to be made during the period of the appeals, the gentleman was, and still is, Chairman of the Holborn Borough Council, and as such must have taken part in revising the valuation list in which the Gaslight and Coke Company were rated in respect of their mains; and the total of the sums at which that Company were rated was specially referred to in the cross-examination of the witnesses by the South Metropolitan Company in their appeal." This went to show that this gentleman had had experience of the rating of gas companies.

Justice BRAY asked whether there were any appeals pending by the Gaslight and Coke Company.

Mr. HORACE AVORY said there were none. Objections were made by that Company against the rating; but reductions were offered by the Committee which satisfied them. Even assuming that the gentleman was Chairman of the Assessment Committee, or that in this position he had judicially decided appeals of another company, it could be no objection to his sitting to adjudicate upon the appeal of the South Metropolitan Company. The only result was to make him a person qualified to deal with such subject-matters. He (Mr. Avory) did not wish to argue the matter further upon general principles, because the very point had been decided in that Court within the last twelve months.

Mr. DANCKWERTS pointed out that he called the attention of Mr. Justice Darling to that decision when the rule was applied for, and the learned Judge said the case ought to be considered on its merits.

Mr. HORACE AVORY said in that case a similar rule had been obtained calling upon the Quarter Sessions of the County of Suffolk to show cause why their judgment should not be returned into Court on the ground that one of the members who heard the appeal was the Chairman of an Assessment Committee in another part of the same county, in which it was suggested that questions as to the rating of sporting rights would shortly come before them. But the Court held that, as a member of the Assessment Committee, he was only interested in having the proper value attached to the property, and the rule was discharged with costs. Mr. Willoughby had made an affidavit in which he said that he had been a Justice of the Peace since 1894; that in 1901 he was appointed a member of the Committee of the Holborn Borough Council, becoming the Chairman in 1904; and that a number of the Justices were selected once a year to consider assessment appeals, and only those having a knowledge of rating were selected. In 1905, he was placed on the rota of Justices, and had sat and heard many appeals—one by the South Metropolitan Gas Company. He had never heard an appeal by the Gaslight and Coke Company, though, as Chairman of the Committee, he had heard objections made by the Company in 1900 when the rate was reduced by £600. From that decision there was no appeal. In 1905, the same Company objected; Mr. Ryde, on their behalf, contending for a valuation which worked out at 10 per cent. on the gross receipts, while the Committee asked for 11 per cent. In the end, the latter view was adopted, which again resulted in a reduction; and from this there was no appeal. At the time of hearing the present appeal, he had entirely forgotten the case of the Gaslight and Coke Company. Then he said (what was quite unnecessary for him to say) that he was not biassed in favour of the Assessment Committee.

Sir RALPH LITTLER said his case was exactly the same. He was not quite disposed to go as far as Mr. Avory had, as he had put on one side the question of waiver. It was well known that if such an objection as the present was to be taken, it must be taken at once. In no case had it been permitted for the person to stand by on the chance of getting a judgment in his favour. There were very few more astute gentlemen than Sir George Livesey; and his principal witness, Mr. Ryde, had actually appeared before Mr. Willoughby at the Assessment Committee. Having cited the cases of the *Queen v. Cumberland Justices* and *Allinson v. General Medical Council*, he submitted that it would be a mischievous thing to hold that, because a gentleman had been on Assessment Committees in one part of London, he was incapacitated from sitting in another place.

Mr. DANCKWERTS remarked that he had seldom heard a case which was said to be so very clear subjected to so much effort to obscure it. If it was so clear, he could not understand why such a large array of Counsel had been brought in on the other side.

Justice BRAY said that the matter was no doubt important.

Mr. DANCKWERTS agreed, but thought his learned friend Mr. Horace Avory was fully competent to deal with it. When the rule was granted, Mr. Justice Darling expressed the opinion that the Suffolk case had no bearing upon the present one; and he would show presently why it had not. Though six Justices took part in the hearing of this appeal, they did not all attend throughout the case—in fact, the Chairman was the only one who was present on all occasions. Mr. Willoughby was there four times.

Mr. HORACE AVORY remarked that the rule was not obtained on that ground.

Mr. DANCKWERTS said the judgment was delivered by the Chairman and two others; the remaining three having disappeared. Though Sir George Livesey was aware on March 2 that Mr. Willoughby was the Chairman of the Assessment Committee, yet he did not know that it was a point on which he could object to his competency. Therefore this was a good answer to the question of waiver. With regard to Mr. Ryde, it was a novelty for him to hear that a person who was present in the capacity of witness was capable of objecting to the constitution of the Court. The Counsel for the Gas Company knew nothing about Mr. Willoughby, so that they were not in a position to consider the matter at all. But what did happen was this: On the second day, Mr. Wallace asked, as Mr. Willoughby could not be there the whole of the next time the Court sat, whether the parties would object to him if he undertook to read the shorthand notes. The parties naturally said they would not object. But when Mr. Willoughby's absence extended to three days, the matter grew different, and things got to such a pass that on the fifth day Mr. Wallace was left in sole possession of the Bench. Then he (Mr. Danckwerts) took the objection that he was not going to submit any more to the case being decided by Justices who were not present, and said it had better be decided by the Chairman alone. However, that was over-ruled, though he did object to Mr. Willoughby sharing in the judgment. Coming to the substantive point, he submitted that this was really a very serious objection. The case was very different from the Suffolk case, as here the county rate was fixed on a basis of its own. It did not matter what was the amount arrived at in any particular Union; and the members of the Assessment Committee being members of an adjoining Union had no bias. Not only was it of the greatest importance that the Courts should be in fact unbiassed, but it was still more important that suitors should believe them to be unbiassed. In the Metropolis, the system was entirely different. Under the Valuation Act of 1849, every occupation throughout the Metropolis was put in one or other of the valuation lists, and by section 45 the list was made conclusive for a number of rates which were spread over the whole of the Metropolis. Among these, for example, was the education rate and the county rate. The result was that any parish in any part of the Metropolis had a direct interest that every other parish should be rated up to its proper limits. This differentiated the present case from the Suffolk one. Mr. Willoughby had a direct interest in seeing that other parishes were rated up to the highest point.

Justice BRAY: So has every ratepayer.

Mr. DANCKWERTS said that as a member of the Borough Council Mr. Willoughby had an interest, or duty, to see that there was no more put upon his borough than could be lawfully put upon it.

Justice BRAY asked whether that was not going too far.

Mr. DANCKWERTS thought not. His next point was that Mr. Willoughby, as a member of the Assessment Committee, was disqualified from sitting; for there was a real possibility of bias, as Mr. Willoughby was alive to the importance of not reducing the assessment. Of course, one way of getting low rates in his own district was to put them up in another, especially when the appellant was a large company such as the South Metropolitan Company, who paid £85,000 in rates.

Justice BRAY asked what interest Mr. Willoughby had other than a pecuniary interest?

Mr. DANCKWERTS replied that, as a member of the Borough Council, he had a duty, and interest, to all his constituents which rendered him liable to the suspicion of bias. Every subject of the realm ought to have the well-assured conviction that when he came into a Court of Justice, there would be no possibility of the judgment being influenced by bias; and this proposition could not be answered in favour of Mr. Willoughby.

Mr. RYDE followed on the same side, and said it was not alleged by the appellants that Mr. Willoughby was consciously biassed in favour of the respondents; but the Company did allege that, in law, he was unconsciously biassed, and any reasonable litigant might suspect him of bias.

* See "JOURNAL," Vol. XCVIII., p. 750.

Justice BRAY asked whether he was open to that charge simply because he was a member of a Borough Council.

Mr. RYDE answered in the affirmative. There was a widespread suspicion among railway and gas companies that they did not get fair treatment at the hands of local authorities in the election of whose members they had no voice.

THE JUDGMENT.

Justice BRAY, in delivering judgment, said the Court were asked to make absolute a rule which had been obtained that a writ of *certiorari* should issue directed to certain parishes to remove into the Court an order made on April 30 dismissing the appeals by the Company against their assessment, upon the ground that one of the Justices was disqualified through "interest" and (or) possibility of bias. Whatever "interest" might mean there, he would first consider the question of pecuniary interest. It was admitted that Mr. Willoughby had no pecuniary interest except as a ratepayer; and Mr. Danckwerts had admitted that he did not proceed upon this ground. Therefore it must be some other "interest" than a pecuniary one on which it was said he was disqualified from acting. Now, what was Mr. Willoughby's position? He was a member of the Holborn Borough Council, and was chosen by the Council as a member of the Assessment Committee, and became the Chairman. He would take the test which was laid down in Allinson's case as the test to be applied to the present, though it went very far indeed, and he was not quite certain himself that he should go that length. Lord Esher there said that any person who took part in the administration of law should not be in such a position that he would be suspected of bias—that it was highly desirable that justice should only be administered by persons who could not be suspected of any improper motives. There were some people whose minds were so perverse that they would suspect without any ground whatever. The man's position must be such as that in substance and fact he could not be suspected—not that any perverse mind could not suspect him, but that he must bear such relation to the matter that he could not reasonably be suspected of being biassed. Now the question which the Court had to consider was whether Mr. Willoughby could be reasonably suspected of being biassed. On what ground? It was said upon the ground that he was a member of the Borough Council. Mr. Danckwerts had stated that every borough council had an interest in the rating of every other parish being as high as it possibly could be, because rates would be to a certain extent diminished thereby. Therefore it was said that a member of the Council must be suspected of being biassed because it was his duty to see that his parish was treated perfectly fairly. This seemed absolutely too remote; and it was rather the ingenious mind of Mr. Danckwerts which had suggested it, than the mind of any reasonable man. That point certainly was not put forward in Sir George Livesey's affidavit as the ground. If one went into such *minutiæ*, it was difficult to see who could not be suspected of being biassed. He did not think it would occur to any reasonable man that, if he was elected to a borough council, it was his duty to put up the rating of other parishes. When the question was put to Mr. Ryde, he answered it by saying that this was a company, and that companies were not allowed to have votes in the election of members of the borough council, which they considered a very great grievance. He did not say that it was not a grievance; but he could not agree in thinking that every borough councillor would do an injustice. If they were to allow these matters to be taken as a suspicion of bias, there would be no end to applications like the present. The question was, in substance and in fact, whether a reasonable person would suspect a man like Mr. Willoughby of bias merely because he was a member of a borough council. This ground clearly failed. Then there was another, and different ground, put forward in the affidavit, though it had not been very much pressed—that it would be his duty to consider objections made by the Gaslight and Coke Company, and therefore he was not fit to sit and deal with this question. That point was entirely disposed of by the Suffolk case. Upon the whole, he was of opinion that the application failed, and that the rule must be discharged.

Justice LAWRENCE said he was of the same opinion. He did not desire in the slightest degree to diminish the stringency of the law which required that every tribunal was to be without interest in the matters in dispute. This was an invariable principle which should be maintained at high-water mark. But the present case did not come within any of the authorities cited. He could not see that there was any interest at all. One had been mentioned—viz., that of a ratepayer. But this had been given up; and the other matters did not seem to come within the meaning of "interest." The only thing that possibly could be suggested was that Mr. Willoughby was a borough councillor, and a member of a different Assessment Committee. But this was too remote. In fact, there was no ground for saying that the possibility of bias existed in the sense of which the law took cognizance. All that could be said of Mr. Willoughby was that he had had large experience in matters of rating, and was of considerable assistance to the Chairman in deciding the present case. Though it was true that companies did not get very sympathetic treatment from local authorities, still this was not a ground for suspecting bias.

The rule was therefore discharged, with costs.

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**Lord Joicey and Municipal Expenditure.**—At the annual meeting of the Newcastle and Gateshead Chamber of Commerce, held last Wednesday in Newcastle, Lord Joicey was elected President in succession to the late Sir Charles Mark Palmer. Addressing the Chamber, Lord Joicey alluded to municipal expenditure, and said that if commercial men could get their capital as easily as municipalities did they would probably see enterprise go very much more quickly than it was doing at present. As time went on, those who supplied the money would watch with a little more jealousy the outpourings of cash for these purposes. Municipal enterprises were apt to become like other concerns not directed by one head. It was difficult to keep down extravagances, and limit expenditure to things which were likely to be profitable, and were actually required. The wider the field and the less the control over that field, the greater was the tendency to spend money without due cause.

## GREENWICH POLICE COURT.—Friday, July 26.

(*Before Mr.* CECIL CHAPMAN.)

### Lewisham Borough Council v. South Suburban Gas Company.

### An Alleged Nuisance—The Disposal of a Gasholder's Tank Water.

The hearing of this case was resumed to-day. It will be remembered the summons was issued, on the application of the Lewisham Borough Council (who were moved to take action by certain inhabitants in the district), against the South Suburban Gas Company for causing effluvia in the manufacture of gas. The proceedings on the first hearing were reported last week.

Mr. A. H. POYSER appeared for the Borough Council; Sir CHARLES MATTHEWS, K.C., for the Company.

Sir CHARLES MATTHEWS now submitted that the proceedings were *ultra vires*. The summons was dated June 21. He thought he should be able to prove clearly that the necessary alterations to the Company's holders were commenced on April 9, and were concluded by May 24; and the section of the Public Health Act of 1891 relating to the matter referred to a nuisance or an alleged nuisance in existence at the time the proceedings were taken.

His WORSHIP: It is a summons for what is in the nature of an existing nuisance.

Sir CHARLES MATTHEWS (proceeding) said the date of the alleged nuisance was April 11, while the summons was June 21. That the alleged nuisance should be in existence at the time of the proceedings was clear from the nature of the wording of the section itself; otherwise a great hardship would be thrown upon the defence.

Mr. POYSER thought this was a misapprehension of the intention of the section of the Act. The section dealt with a penalty for a wrongful act which had been committed by the Gas Company. There was a fine imposed for any particular nuisance caused by them. This was not the section where an order was made to abate a nuisance.

Sir CHARLES MATTHEWS: The proceedings in the Police Court are surely to put an end to anything that exists, and not for a thing that is past.

Mr. POYSER maintained that, if the section was read clearly, it might be deemed to also refer to a past thing, because it said "unless it is shown that such person has used the best practicable means." Continuing (after further discussion), learned Counsel said the moment a nuisance was committed, there was a liability to fine; and he was asking for a fine that day, and not for an order to abate a nuisance.

Sir CHARLES MATTHEWS said the point was before his Worship. But before leaving it, he should like to call attention to sub section 2 of section 21, under which his Worship had certain power. It said: "Provided that the Court may suspend its final determination on condition that the person complained of undertakes to adopt, within a reasonable time, such means as the Court may deem practicable, and order to be carried into effect, for abating the nuisance, or mitigating or preventing the injurious effects of the effluvia." Throughout it ran "to be" a nuisance, and not "to have been" a nuisance.

Mr. *S. Y. Shoubridge*, examined by Sir CHARLES MATTHEWS, said he was Engineer to the defendant Company, and had had some 30 years' experience in the management of gas-works. Owing to the increasing consumption of gas in the district served by his Company, it had become necessary to enlarge two of the holders—Nos. 7 and 8. They were at the present time adding a fourth lift to them; and in order to put the rest-stones in the bottom of the tanks, it was necessary to take out the water. It was originally intended to alter only one of the holders—No. 8—this year; but when they proceeded to pump the water out of the tank, and had reached a depth of about 26 feet, they found the water from the adjacent tank, which was only about 30 feet distant, was finding its way through the bottom of the tank of No. 8. It therefore became necessary to immediately take the water out of No. 7, so as to prevent it suddenly rushing into the other one. The pumping from No. 8 holder began on April 8, and from No. 7 on May 9. The pumping from No. 7 finished on May 22, and from No. 8 on May 24. This completed the work, so far as removing the water from the tank was concerned. The water had been in the tanks in one case for 17 years, and in the other for 26 years. It was impossible to add the fourth lift without taking the water from the tanks. It was drawn out by a steam-pump, and conveyed by a cast-iron pipe into the drain which ran through the works into the sewer. The water was quite clear, and free from any solid impurity. It was strongly impregnated with gas. It had no chemical action whatever; but it was exceedingly difficult to rid it of its gassy impregnation. He had tried various means of robbing it of smell, but had not succeeded. It was neither acid nor alkaline, nor did it contain any sulphuretted hydrogen. It was impossible for Mr. Redgrave (*ante*, p. 257) to have smelt sulphuretted hydrogen passing through the air the distance of his house from the works. It was possible, of course, for the smell of gas to have travelled along the sewers, and to have come out from the ventilator gratings, of which there were two right in front of Mr. Redgrave's house; but it was not possible for the smell of sulphuretted hydrogen to have been carried by the water, as there was no sulphuretted hydrogen in it. He thought the smell from the water that had been so long imprisoned might reach perhaps from 100 to 150 yards from the works; but he could not conceive of there being any smell from it beyond that distance. At the time of receiving the complaints, he had, with several others, been round the roads nearest the works; and they did not detect any smell. In making the alterations to the holders, everything possible was done to ensure that there should be a minimum of effluvia. There was only one way of dealing with water from a holder tank, and that was to pump it out, carry it in a closed pipe into the sewer, and to do it as quickly as possible. That they did in this case. He had no doubt that Mr. Furneaux did smell something when passing along the roadway just outside the works. The smell of the holder water was a distinctly gassy one; and it might be disagreeable to some people. It was different from a strong sewer smell, which was a putrid and highly acrid smell. Only two or three days since, he was woke up in the night by

the smell from a sewer-ventilator. His bedroom was filled with the odour. It was a foggy morning. He knew that many other people noticed the smell. An attenuated sewer smell might be very easily mistaken by some people for a gas smell.

[A sample of water from a gasholder tank was here produced. It was clear, and had little smell. Witness stated that the tank from which it was taken had been in use thirty years; and his Worship, on smelling it, remarked that there was nothing offensive about it.]

In further examination, witness spoke to a visit to the works of two Sanitary Inspectors on April 17, and they returned on April 19, accompanied by Dr. Harris, the Medical Officer of Health. He (witness), with his chief foreman, went with Dr. Harris and the Sanitary Inspectors to see the gasholders. He showed them exactly what was being done, and explained that they had been pumping the water out and putting it into the sewers since April 8. At the time they were there, the pump had temporarily stopped. He told Dr. Harris that he knew of no other way of dealing with the water, and asked him if he could suggest any other. He said "No," and added, "Put it into the sewer, but don't put it into the river." They had been putting the water into the sewer from April 8 to 19; and he was anxious to know if Dr. Harris could suggest a better way of dealing with it. Dr. Harris also remarked: "I know you must do this sort of thing; and I want you to do it as quickly as you can, and with as little nuisance as possible." That was what he (witness) did—pumped it into the drain to the sewer as fast as the former could carry it off. Witness also spoke to another visit of the Sanitary Inspectors on May 28—four days after the tanks had been emptied. On this occasion, it was the Medical Officer who had been awakened from his sleep by some nauseous smell. He (Mr. Shoubridge) wished the Sanitary Inspectors to immediately go round the works to see whether they could find anything that could possibly cause smell; and he showed them, by the wind records kept at the works, that the wind at the time Dr. Harris was inconvenienced was blowing away from his house to the works. He told the men to suggest to Dr. Harris that there must be something nearer to his dwelling that caused the smell which he had mistaken for a gas-works smell. The Sanitary Inspectors agreed on that occasion that the smell complained of could not have come from the gas-works. With this exception, there had been no complaint since May 24, when the pumping ended. The smells from the works in 1904 were caused by the removal of the foul lime from the purifier-boxes—lime being then used in the purification of the gas. The Chairman of the Company (Sir George Livesey), through a Bill in Parliament, obtained their release from the obligation to purify by lime. The last of the lime purifiers was emptied on Sept. 24, 1904. Lime had not since been used; so that the smell in the spring of this year could not have been the same as in 1904. Oxide was now solely used; and there was no offensive smell from it, nor a smell that would travel. Mr. Redgrave had suggested that the explanation of the smell was some process of gas enrichment; but they had now abandoned enrichment. Through the lower standard of illuminating power allowed by the Company's last Act, there was no necessity for any enrichment. Regarding Mr. Walter Mason's statement that what caused the smell also produced an oily film on the leaves of plants, this was an entire misapprehension. In proof of this, a number of the other gentlemen who were present—one particularly, Mr. Selfe, who lived much nearer the works—had a splendid show of flowers, growing most luxuriantly, at the present time. Mr. Furneaux had also a splendid garden. At the foot of Mr. Mason's garden was the Sydenham Recreation Ground, where could be seen at any time a fine display of flowers. Two of the most famous nurseries in the kingdom—Messrs. Carter's and Messrs. Laing's—were under ¼ mile from the works: and they had never had complaints from them. He was sure the smell could not have been carried through the atmosphere the distance spoken to by the witnesses; and he could not account for the smells in any other way than that they came up through the sewer gratings. The best practicable means were used for preventing and abating any nuisance; and speaking after an experience of over thirty years, during which he had emptied a great many gasholder tanks, he knew of no other plan that could possibly have been adopted.

Cross-examined: It was impossible for smell from the works to be carried by means of the air so far as Dacres Road. The witnesses at the previous hearing were all highly reputable and excellent gentlemen. He did not dispute that Mr. Furneaux might have noticed a strong smell on passing the works; but he must have carried it in his nose up to his house. He probably noticed a strong smell on passing the works, and, thinking badly of it, no doubt it lingered with him. He (witness) was quite certain of this, that had Mr. Furneaux been coming from his house towards the works, he would not have detected the same smell at his house. Their enrichment process was discontinued in 1906. The process was carburetted water gas; and the storage of the gas might have left a film on the water in the gasholder tank. The gas, however, was stored mixed with coal gas. Questioned as to whether there was not a great deposit from this, both on the water and under the water, he said there was not a great deposit, but he did not say there was no deposit at all. There was just a floating film on the top of the water; and when the water was taken out of the tanks, a filmy deposit was left on the clay bottom. It did not adhere to the side plates of the holder at all, or to the sides of the tank. It simply rested as a thin film on the bottom of the tank. He could give no reason at all why the smell complained of was worse on April 11—the day might have been a very hot one. He had heard the witnesses speak of offensive smells in March; but they could not have been from the tank water. There was nothing in their ordinary operations that could have caused this smell. But it was possible that the smell coming up on the line of the sewers, where the tank water was being put in, might cause people to complain. The filmy deposit on the bottom of the holder tank was not thicker than a sheet of notepaper. The water used in the tanks was river water; and there was a sediment from the river water—the alluvial soil that came down with the river. When the water became quiescent, this settled out, and sank to the bottom of the tank. He could not say whether the sediment was permeated with the smell of the gas the same as the water. The sediment was exposed to the air on the water being pumped out; and it simply dried up on the surface. When the holder was first opened, of course the water would smell stronger than the sample in the bottle, because the water covered a large area—the holder being 150 feet in diameter. Questioned as to whether there was any other process at the works that would produce smell, witness said there was nothing done there that was not done at all gas-works. When coke was quenched with water, a small quantity of sulphuretted hydrogen was liberated. This was a process, however, that was going on day and night in all gas-works; and the smell was not one that could be noticed beyond the confines of the works. He knew men were sent into the sewers at night to clear obstructions, because there was so much water going into them in the daytime that they could not work there.

Re-examined: There had been men working in the holder tanks for some considerable time; there were nearly 100 working there now. He had never heard of any ill-health among the men. Asked whether there was anything coming from the works during the time of the holder alterations other than the smell produced by the tank water, he said there was nothing but the ordinary gas-works smell. If the smell travelled along the sewers, it might be noticed, where there were ventilator openings, possibly a mile away.

Mr. *Charles Carpenter* said he had had to empty several gasholder tanks in the manner described by Mr. Shoubridge; and he thought that was the only way of emptying them. In his opinion, it was the proper treatment to put the water in the drains; he knew of no other means of dealing with it. When the water in the tank was exposed, there was undoubtedly some smell. It was a very characteristic smell; and when once smelt, he did not think it would ever be forgotten. The evidence of Dr. Harris in this respect was correct; it was quite a characteristic smell. The sample of water that had been put in was a fair one of the water ordinarily found in gasholder tanks. To smell it in small quantities, it was not offensive, but in large quantities, such as in the holder tanks, he thought many people would say it was unpleasant—nothing more. To use an illustration. Some perfumes that in small quantities were pleasant, in large quantities were offensive. It was exactly the same with the sample of tank water, which was a truly representative one, and the water in the tank. As to its carrying power, he had emptied several tanks, and had never had any complaint of a smell farther away than 30 or 40 yards. Those who complained most in his experience were the people living in premises backing on to the works where the holders were. He had had to empty several of the gasholder tanks near to the Kennington cricket ground; and it was impossible to smell any of those in passing through the roads in the neighbourhood. The gentleman who at the last hearing said he did notice the smell near the gas-works might have done so; but with the others, he (witness) asserted it was impossible.

His Worship: What I have to find out is, how these gentlemen who complain have come to smell what they have described, and how they have come to be mistaken. They say they can only trace it to the gas-works. I have to find some solution. You have helped me by saying that the smell from the tank water could not have reached the distance. Therefore it must have been something else. I have to find out that "something else."

Examination continued: As to sulphuretted hydrogen, they were troubled with it in the days of lime purification. It was only given off in small quantities in the quenching of coke. He had managed two large works, and had never known any complaints to arise from the quenching of coke. The smell that was given off was much the same as that which arose from the quenching of a fire. It was due to the sulphuretted hydrogen in it. The quantities, however, were so small that the smell was quite local, and disappeared within the confines of the works. There was another reason why this could not have been the cause of the complaints of the gentlemen who gave evidence the previous week. If there had been a sufficient quantity of sulphuretted hydrogen discharged from the works to reach 700 and more yards away, the whole neighbourhood would have been up in arms; for the people residing 700 yards away would only have got (so to speak) the "fag-end" of the sulphuretted hydrogen. He did not think the people in between would have been peaceable under the circumstances. Moreover, the whole of the silver in their houses would have been blackened. Sulphuretted hydrogen in large quantities did deposit not only on plants, but in the roadway, something of an oily nature; but to do this it had to be present in large quantities—such as would be produced by lime purification. Where the process of purification was by oxide, it would be quite impossible for there to be any such escape of sulphuretted hydrogen. Sulphuretted hydrogen did come from sewers in small quantities; and he believed it was due to the decomposing organic matter. He thought it was perhaps owing to this that those who were accustomed to search for escapes of gas differentiated between the two—coal gas and sewer gas—by reason of the fact that sewer gas produced nausea that did not arise from coal gas. Asked as to what, in his opinion, was the source of the complaint made by the witnesses at the previous hearing, witness said, when he heard their evidence, he could not help thinking of a similar experience of his own in managing a works. The Medical Officer of Health paid him one or two visits, because the House of Commons had been complaining of nauseous smells. The Medical Officer came to his works simply because they were the nearest to the House; but, in the end, it was found that it was the sewage system of the House itself that was defective, and some £11,000 had to be spent in putting it right.

Sir Charles Matthews: What in your opinion was the justifiable source of the complaint of these gentlemen?

*Witness:* That is a difficult question. I can only tell you that, in my opinion, it was not the gas-works. I visited the works in December last, and spent several hours there. The manufacturing operations were then in full swing. I went there again a fortnight ago, when things were quieter. They are admirably conducted works.

Cross-examined: He had not had experience with the manufacture of carburetted water gas as carried out at Sydenham; but he had with enrichment by oil. He knew there was a deposit produced by carburetted water gas on the tank water; but he did not agree with the suggestion as to there being any pungent smell. Anyone who was working where there was sulphuretted hydrogen would be glad to go to water gas as a relief. As to water gas being a nuisance, its manufacture was carried on in most corporation gas-works in the country; and he did not think they would carry on a nuisance. Any smell that

was produced would be diffused long before it reached such a distance as the Dacres Road. As to the film of deposit at the bottom of the gasholder tank, he had not smelt it from the top of the tank. There might be a little reek rising from it; and he daresay if one put his head over the tank that he would be conscious he was not looking into a water-works reservoir, but into a gasholder tank. This, however, could not have caused the smell in Dacres Road. They would have to pay their men double money if the thing was so bad as that. The smell in Dacres Road might have come from the sewers.

Mr. POYSER: I suggest to you that this film as it has been called—or the sediment I would rather call it—was the cause of the smell?

*Witness* replied in the negative. He thought there had been a little confusion over the film and the sediment. There would be no film on the top of the water other than an immeasurably thin one—as thin as a sheet of note paper it had been said, but it would be much thinner than that. Nothing more would be resting on the surface of the tank. No water-gas enrichment had been going on at these works for some months; and therefore any oily matter would have been volatilized, and have gone forward with the gas. That disposed of the film. On the bottom of the tank there would have been a little settlement of naphthalene. This deposit looked about ¼ inch thick; it might have been less. He believed that ½ gallon would have produced the film over the whole of the tank: it was so thin.

There was some discussion at this point as to a further adjournment. In the course of it,

His WORSHIP said that the impression made upon him by the gentlemen who had given evidence the previous week was that there had been a nuisance which, although it had been scotched, had not been killed, and which, by a little more pressure, might be completely destroyed. This was his first impression, but he could not reconcile it now with the evidence of the Company's witnesses. Any impression there was had been relaxed. Later on, he asked if there was no possibility of tracing the nuisance to any particular cause. At the present, he should say the smell had nothing whatever to do with the water in the holder tanks. It must be from some other cause. Therefore it seemed to him the cause was not a temporary one; it was something larger than that. What they had to do was to make it impossible for these gentlemen to suffer as they had hitherto suffered.

Sir CHARLES MATTHEWS asked whether it would not be a reasonable thing that the matter should be adjourned (say) for two months; and then during August and September, both parties could be watching very closely for the purpose of seeing where the cause of offence did come from. If they could only discover what the offending cause was, it would be a good way of spending the two months.

His WORSHIP: The case being met as it is by a complete denial on the part of the Company, and a complete assertion of a most definite character by two gas experts that they cannot, by the utmost stretch of imagination, trace this smell to the gas-works, it does seem to me essential that the evidence that has been brought before the Court should be supplemented by people of an expert character who should really find out whether the smell does exist, and whether it does or does not come from the sewers. Personally, from the evidence on the positive side, I think there is no tracing it to the sewers. But it would be a great advantage to the Court, in making up its mind, to have this thing very carefully watched by people engaged for that particular purpose; and as defendants had offered the suggestion that they were willing in these two months to submit themselves to careful examination by experts, it would be a great advantage to everybody, and a good thing.

Mr. TEMPLER DOWN (Solicitor to the Council): The cost of watching will be considerable.

His WORSHIP: Then it will have to be paid by the defendants, if the case goes against them.

Mr. TEMPLER DOWN: I do not think the trouble will occur again in the next two months.

His WORSHIP: That will be evidence that it can be stopped. The case will not be neglected because it is put off, and the defendants will not escape their liabilities.

Mr. POYSER: And we shall be in a position to make a rebutting case.

His WORSHIP: I desire you should be, and that the nuisance should be traced to its source. The defendants will have to pay something besides the fine if it is traced to them. The matter will now be adjourned *sine die;* and a day will be named for a further sitting in about two months' time.

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**Water Purchase Bill for Skegness.**—At a special meeting, the Skegness Urban District Council have decided (with one dissentient) to promote a Bill in Parliament to authorize them to purchase the undertaking of the Skegness Water Company, to make further and better provision with regard to the improvement of the health, local government, and finance of the district, and for other purposes. The Clerk read a report by Mr. W. H. Radford, Consulting Engineer, of Nottingham, who stated that he had carefully inspected the boring and works at Welton, and was of opinion that the water was of good quality and ample quantity. A ratepayers' meeting will be held in November for the purpose of authorizing the scheme, or otherwise.

**New Joint-Stock Companies.**—The Gowerton and District Gas Company, Limited, has been registered with a capital of £15,000, in £5 shares (£1500 in 7 per cent. preference shares), to adopt an agreement with the Gas and Water Works Supplies and Construction Company, Limited, and to carry on the business of manufacturers and suppliers of gas. The Ludlow Union Gas Company, Limited, with a capital of £5690, in 611 ordinary and 526 preference shares of £5, all taken up and paid in full, is a re-incorporation, with limited liability, of the Ludlow Union Gas Company, originally constituted by Deed of Settlement dated May 29, 1840, and registered as an unlimited Company on May 4, 1874. The Improved Smokeless Coal Company, Limited, has been registered with a capital of £5100, in £1 shares, for the supply of an improved smokeless coal. There will be no initial public issue. The Globe Safety Gas Company, Limited, has been registered with a capital of £15,000, in £1 shares.

## THE CHARGES AGAINST MR. GILBERT LITTLE.

### An Apology.

At the Smethwick Police Court, last Thursday, a termination was reached of the case in which Mr. Gilbert Little, of the Gilbert Little Company, Limited, of Bradford, was summoned, at the instance of Mr. Henry Peaty, of the New Conveyor Company, Limited, for having on March 13 last, and other dates, unlawfully and maliciously published certain defamatory libels concerning him, and also for feloniously and maliciously sending to him on May 21 a letter demanding with menaces the sum of £872. The complainant succeeded the defendant as Managing-Director of the New Conveyor Company; and the case arose in consequence of a number of letters which had been sent to persons in various parts of the country by the defendant which the complainant alleged were of a libellous character, as they cast serious reflections upon him, while one addressed to himself contained an unlawful menace demanding money. The case was before the Court earlier in the month [see "JOURNAL" for July 16, p. 180], when an adjournment was ordered, so that Mr. Little might attend.

When the case was called on, Mr. Willison, who prosecuted, explained that since the adjournment the defendant had unreservedly placed himself in the hands of his Solicitor. Mr. Sharpe, who appeared for the defence, had seen him (Mr. Willison), and had expressed, on behalf of defendant, his extreme regret for everything that he had done, and had tendered the prosecutor an apology for what had taken place. He had further given an undertaking that no conduct such as that complained of—or for that matter any conduct to which the prosecutor could take exception—should ever happen in future, so far as he could prevent it. The defendant had come forward, and offered to defray the whole of the expenses to which the prosecutor had been put as a result of his conduct. Under these circumstances, the prosecutor had instructed him to come to the Court—believing defendant was prepared to offer an apology, and that he was sincere in his undertakings—and withdraw the proceedings, subject to the consent of the Justices. He therefore proposed to offer no evidence in the case. Defendant would bear all the costs.

On behalf of the defendant, Mr. Sharpe said he was extremely indebted to both the prosecutor and Mr. Willison for the manner in which they had met them. It was a case to which he had given careful and anxious consideration, and he felt convinced from the first—as he told his client when he consulted him—that Mr. Little had done a most unjustifiable action, and had written unjustifiable letters—silly letters—that could not be defended for a moment in any Court. This being the case, the defendant agreed with him, and left himself entirely in his (Mr. Sharpe's) hands. The only thing they could do was to make a complete and unreserved apology for what had taken place, and thank the prosecutor for the manner in which he had met him. He endorsed what had been said by Mr. Willison; and they were prepared to carry out the terms he had mentioned.

After a brief consultation, the Magistrates agreed to the case being withdrawn.

## WESTMINSTER COUNTY COURT.—Tuesday, July 16.

(*Before His Honour Judge* WOODFALL *and a Jury.*)

### Buck v. Metropolitan Water Board—Liability for Injury through Stopcock-Lids.

This was an action brought by Mr. Walter William Buck, a head schoolmaster in the service of the Willesden District Council, to recover damages for personal injuries caused through his tripping over stopcock-lids in Shakespear Avenue, Stonebridge Park.

Mr. F. M. ABRAHAMS appeared for the plaintiff; Mr. A. B. SHAW represented the defendants.

Mr. ABRAHAMS said the plaintiff claimed with respect to two injuries—the first sustained in November and the second in January. Plaintiff resided in Acton Lane, Harlesden, and he passed along Shakespear Avenue on his way to and from his school. The result of his two falls was that his knee was injured in such a way that his medical man (Dr. Burns Gibson) advised him to go to the hospital to have it attended to; but he went to a bone-setter and obtained relief. Negligence was alleged against the defendants on the ground that the lids covering the stopcocks were not flush with the pavement, but stood up above it. The defendants said they were not liable, as they had done with the lids when they had fixed them; after that the local highway authority—in this case, the Willesden District Council—was responsible for seeing that the highway was safe.

Plaintiff was called, and described how he was tripped up at the same spot on two occasions, and how his injuries were put right. Dr. Burns Gibson and the bone-setter also gave evidence.

Mr. *Haylor*, Assistant-Surveyor to the District Council, stated that this body had nothing to do with the fixing of stopcocks. In Willesden they were put in by the West Middlesex Water Company, and were taken over by the Water Board. The pathway was made up of 4 inches of concrete covered by 3 inches of tar paving. In Shakespear Avenue it was not at all worn down by the stopcocks, neither had it in any way collapsed. Tar paving that had been down in Willesden for twenty years showed no sign of wear.

Mr. *John Cash* said he had examined the tar paving in the neighbourhood of the stopcocks in the avenue, and found no sign of wear or subsidence. In his opinion, they had been fixed without proper care, and at a wrong level.

Other witnesses having deposed to being tripped up by stopcock-lids,

Mr. *Howard Barnard*, one of the managers at the school where plaintiff is engaged, said he complained to the Board about the lids standing up, and in some cases they had been made flush with the pavement. He saw the District Engineer and Superintendent to the Board (Mr. E. C. Barker), who said there was no liability on their part, as it was for the Local Authority to keep the pathway in order.

For the defence, Mr. *Barker* gave evidence to the effect that there was a constant supply of water in the avenue, and that it was necessary to have stopcock boxes, which were always put in so as to be a little below the surface of the path.

Workmen in the employ of the Board gave evidence that the boxes were put in at a level slightly lower than that of the tar paving. The paviors followed the men who put in the boxes.

### Wednesday, July 17.

On the resumption of the hearing of the case this morning,

Mr. SHAW submitted that no case had been made out against the defendants, as to either negligence or liability. It was the duty of the District Council to repair anything lawfully in the highway, and the plugs in question were lawfully there. He cited several cases, and the provisions of the Public Health Act, in support of his contention. He said the only point that could be brought against the Board was that the plugs were put down ½ inch too high; but, if this was so, the Local Authority had neglected their duty by allowing them to remain for 3½ years.

Mr. ABRAHAMS interposed by reading section 19 of the West Middlesex Water Act, 1852, in which it was laid down that the water authority must do their work in such a way that the public must be safeguarded, and must be responsible for any accident.

Mr. SHAW contended that it was the duty of the Local Authority to have made this highway level; and there was no proof of any breach of duty on the part of the defendants.

Mr. ABRAHAMS again read the section of the Act of the West Middlesex Water Company, which had been taken over with all their duties and responsibilities, by the defendants. All the witnesses agreed that the highway was in perfect repair, and there was evidence of many accidents in consequence of these protruding boxes. There was evidence that the defendants had knocked down the boxes after the accident; and he submitted that this was an admission of liability.

The Jury returned a verdict for the plaintiff for £67; but judgment was reserved to allow of a legal argument.

### Wednesday, July 24.

To-day his Honour heard the arguments of Counsel, and entered judgment for the plaintiff. He would not say whether or not he agreed with the conclusions of the Jury; but they having found that the defendants negligently placed in the highway the obstruction complained of, he granted the plaintiff £67, with costs.

Mr. SHAW asked for a new trial.

His HONOUR said he would not then consider the application, but would do so at a future date if Counsel was instructed to renew it. In order to save expense, he said he might state that he was not disposed to grant a new trial.

## Brussels Municipal Gas Supply.

According to the report of the Gas Committee of the Brussels Municipality for the past year, there was a falling off in the consumption of gas. The quantity used in 1905 was 39,986,157 cubic metres, or about 1411½ million cubic feet, whereas last year it was 39,287,099 cubic metres, or rather more than 1386¾ million cubic feet. This is ascribed to the competition of electricity. The receipts were 7,326,090 frs. (£293,044); and the expenses 5,023,455 frs. (£200,938). Reckoning 274,833 frs. for the increase in the value of the stores, the difference in favour of the communal account is 2,577,469 frs. (£103,099). The quantity of coal carbonized was 124,694 metric tons. The expenses of first establishment came to 495,288 frs. (£19,851), comprising the purchase of an elevator for discharging coal, the construction of the foundations of a holder, six purifiers, and various appliances. At the close of the year, the capital account stood at 31,738,175 frs. (£1,269,527). The number of meters increased by 1875, making the total 40,259; and the rising pipes, by 222. There were 471 new installations of gas last year; bringing up the total to 14,993. There are in the city 6776 public lamps, of which 673 are extinguished after midnight.

## Public Lighting in South London.

At the meeting of the Lambeth Borough Council last Thursday, the Town Clerk reported that he had sent a letter to the Gaslight and Coke Company in reference to their circular announcing an increase in the price of gas used for public lighting from 2s. 2d. to 2s. 5d. per 1000 cubic feet. He pointed out that the South Metropolitan Gas Company had not raised their price (by which that of the Gaslight and Coke Company is governed); and he asked why, under these circumstances, the advance of 3d. had been made. Replying in the absence of the Secretary (Mr. H. Rayner), the General Manager (Mr. D. Milne Watson) explained that the increased price of gas in the case of certain public lamps within the South Metropolitan Company's district was balanced by a reduction they were enabled to make in the charge for maintenance, which, of course, had no effect on the statutory obligation laid upon the Gaslight and Coke Company to regulate their charge for gas by that of the neighbouring Company. The Lighting Committee reported that they had given directions that efforts should be made to induce the Gaslight and Coke Company to take the same action in regard to street lighting as the South Metropolitan Company had done. On Oct. 11 last year, the Council decided to allow the former Company to experiment for a period of three months with an appliance for automatically lighting and extinguishing the public lamps; and on the 25th of April the time was extended to the 30th of June. The Company's Chief Inspector (Mr. F. W. Goodenough) had written to the effect that other appliances had been brought under their notice, and as these would be considerably cheaper to instal than the system which had been tried and found satisfactory in Lambeth, he should be glad to have a further extension of time till the end of September. This was granted.

# MISCELLANEOUS NEWS.

## GASLIGHT AND COKE COMPANY'S ACCOUNTS.

[For the Half-Yearly Report, see p. 301.]

The accounts of the Company for the six months ending June 30, to be submitted with the Directors' report on Friday, consist of the usual statements, from which we take the following particulars.

The statement of capital (stock) sets forth that the total paid up is £9,466,500; added on conversion, £12,176,565—total amount authorized, £21,643,065. Deducting the amount redeemed, £60,610, the total amount of the Company's existing capital powers is £21,582,455. The statement of loan capital stands thus: Total paid up, £2,844,000; added on conversion, £1,479,975; unissued, £750,000—total amount authorized, £5,073,975.

The capital account shows receipts (with premiums, £1,586,807 11s. 9d.) to the amount of £27,493,237 11s. 9d. The expenditure is shown in the following items:—

| | | | |
|---|---|---|---|
| Expenditure to Dec. 31, 1906 | | | £13,458,626 15 2 |
| Expenditure during the half year to June 30, 1907—viz., | | | |
| Buildings and machinery in extension of works | £4,695 8 7 | | |
| New and additional mains and service-pipes | 15,051 7 3 | | |
| Do. do. meters | 21,599 3 3 | | |
| Do. do. stoves | 12,970 16 4 | | |
| | £54,316 15 5 | | |
| By depreciation of plant | £25,855 0 7 | | |
| By depreciation of meters and stoves | 27,589 8 11 | | |
| | 53,444 9 6 | | |
| | | | 872 5 11 |
| Total expenditure | | | £13,459,499 1 1 |
| Nominal amount added on conversion | | | 13,656,540 0 0 |
| | | | £27,116,039 1 1 |
| Deduct amount of capital redeemed under Company's Act of 1903 (per previous account, £40,090; this half year, £20,520) | | | 60,610 0 0 |
| | | | £27,055,429 1 1 |
| Balance of capital account | | | 437,808 10 8 |
| | | | £27,493,237 11 9 |

The balance applicable to the redemption fund and to dividend on the ordinary stock is £651,159 6s. 5d.; and the following statement shows how it is proposed to appropriate it.

| June, 1906. | | | |
|---|---|---|---|
| £181,299 | .. | Net balance brought from last account | £229,952 19 11 |
| 373,651 | .. | Net revenue for the half year | 421,206 6 6 |
| £554,950 | | | £651,159 6 5 |
| 10,000 | .. | Contribution to redemption fund | 10,000 0 0 |
| (£4 8s. per cent.) | | Dividend on the ordinary stock— | |
| £334,469 | .. | £4 8s. per cent. per annum on £15,182,590 | 334,016 19 7 |
| .. | .. | Forfeitures for deficiency in illuminating power | 150 0 0 |
| £210,481 | .. | Balance carried to next account | £307,992 6 10 |

The following is the revenue account:—

*Expenditure.*

| June Half Year, 1906. | | £ s. d. | £ s. d. |
|---|---|---|---|
| | Manufacture of gas— | | |
| £ 00,940 | Coal into store | 556,771 0 1 | |
| 78,536 | Oil ,, less value of oil tar | 80,539 12 10 | |
| 27,145 | Coke and breeze used in the manufacture of carburetted water gas | 33,604 6 8 | |
| 15,357 | Salaries of Engineers and other officers | 14,917 1 8 | |
| 10,000 | Wages, gas making £91,195 0s. 8d. | 104,618 10 11 | |
| 16,651 | ,, sundries £13,423 10s. 3d. | | |
| 35,402 | Purification, including £10,892 9s. 6d. for labour | 22,624 17 11 | |
| 199,794 | Repair and maintenance of works and plant, materials and labour, less received for old materials, £10,097 1s. 8d | 212,228 4 10 | |
| | Distribution of gas— | | 1,025,304 4 11 |
| 41,966 | Salaries and wages of officers (including Rental Clerks) | 43,154 16 11 | |
| 60,280 | Repair and maintenance of mains and service-pipes, &c. | 56,891 18 6 | |
| 28,927 | Repair and renewal of meters | 46,468 14 1 | |
| 36,391 | ,, ,, stoves | 50,727 12 8 | |
| .. | Gas fittings, including labour (automatic meter supplies) | 29,258 2 10 | |
| | | | 226,501 5 0 |
| 19,691 | Public lamps—lighting and repairing | .. | 19,519 15 3 |
| | Rents, rates, and taxes— | | |
| 5,782 | Rents payable | 5,850 4 4 | |
| 144,197 | Rates and taxes | 136,522 18 7 | |
| | Management— | | 142,373 2 11 |
| 2,750 | Directors' allowance | 2,750 0 0 | |
| 200 | Company's Auditors and Assistant | 202 2 0 | |
| 7,655 | Salaries of General Manager, Secretary, Accountant, and clerks | 7,911 0 6 | |
| 22,770 | Collectors and Cashiers | 22,880 5 8 | |
| 5,673 | Stationery and printing | 5,337 18 2 | |
| 4,427 | General charges | 4,780 17 7 | |
| | | | 43,862 3 11 |
| 664 | Parliamentary charges | .. | .. |
| 1,336 | Law charges | .. | 1,156 14 6 |
| 350 | Charges *re* quinquennial re-valuations | .. | .. |
| 5,250 | Bad debts | .. | 5,413 14 7 |
| 500 | Depreciation fund for works on leasehold lands | .. | 500 0 0 |
| 23,323 | Annuities, including contribution to officers' superannuation fund | .. | 24,378 15 11 |
| 1,529 | Workmen's compensation account | .. | 1,321 15 2 |
| | Public officers— | | |
| 1,280 | Gas Referees and Official Auditor | 1,244 17 6 | |
| 1,009 | Public testing-stations | 612 11 7 | |
| | | | 1,857 9 1 |
| £1,397,775 | | | 1,492,189 1 3 |
| 569,879 | Balance carried to net revenue account | | 628,992 16 3 |
| £1,967,654 | | | 2,121,181 17 6 |

*Receipts.*

| June Half Year, 1906. | | £ s. d. | £ s. d. |
|---|---|---|---|
| | Sale of gas— | | |
| £1,480,735 | Per meter, at 2s. 11d. and 2s. 2d. per 1000 cubic feet . . . . . | 1,520,595 8 7 | |
| 68,910 | Public lighting and under contracts . . | 68,772 10 2 | |
| | | | 1,589,367 18 9 |
| £1,549,655 | | | |
| 37,196 | Rental of stoves . . . . . | .. | 37,326 1 4 |
| . | Rental of fittings . . . . . | .. | 58,545 0 7 |
| | Residual products— | | |
| £211,973 | Coke, less £35,647 9s. 8d. for labour, &c.. | 271,911 13 9 | |
| 14,4 0 | Breeze, less £5074 1s. 7d. for ditto . . | 13,696 12 8 | |
| 50,959 | Tar and tar products . . . . . | 47,929 4 9 | |
| 98,578 | Ammoniacal liquor and sulphate of ammonia. . . . . | 95,522 2 3 | |
| | | | 429,059 13 5 |
| £375,970 | | | |
| £4,523 | Rents receivable . . . . . | | 4,568 5 11 |
| 3 0 | Transfer fees . . . . . | | 314 17 6 |
| £1,967,654 | | | 2,121,181 17 6 |

The three statements relating to the reserve, insurance, and depreciation funds show that the balances on June 30 were as follows: Reserve fund, £63,198 3s.; insurance fund, £94,055 7s. 8d.; and depreciation fund, £64,746 3s. 10d. A sum of £9208 13s. was written off the investment of the insurance fund in the past half year; reducing the cost of Consols to 85 per cent.

The following statements relate to the working:—

*Statement of Coals Used, &c.*

| Description of Coal. | In Store Dec. 31, 1906. | Received During Half Year. | Carbonized During Half Year. | Used During Half Year. | In Store June 30, 1907. |
|---|---|---|---|---|---|
| | Tons. | Tons. | Tons. | Tons. | Tons. |
| Common. . . . | 224,740 | 783,133 | 876,004 | 2,134 | 129,735 |
| Cannel . . . . | 12,036 | .. | 3,922 | .. | 8,114 |
| Total . . . | 236,776 | 783,133 | *879,926 | 2,134 | 137,849 |

* In addition to this quantity of coal, 7,285,106 gallons of oil and 58,441 gallons of spirit were used during the half year.

*Statement of Residual Products.*

| Description. | In Store Dec. 31, 1906. | Made During Half Year. | Used During Half Year. | Sold During Half Year. | In Store June 30, 1907. |
|---|---|---|---|---|---|
| Coke—tons . . . . . | 17,378 | 549,392 | 111,667 | 443,004 | 12,099 |
| Breeze—tons . . . . | 2,303 | 74,803 | 13,640 | 60,048 | 3,418 |
| Tar, from coal only—galls. | 838,939 | 8,915,798 | 9,107,799 | 17,258 | 629,680 |
| Ammoniacal liquor—butts | 21,763 | 223,301 | 230,800 | .. | 14,264 |

*Statement of Gas Made, Sold, &c.*

| Quantity Made. | Quantity Sold. | | Total Quantity Accounted for. | Number of Public Lamps. |
|---|---|---|---|---|
| | Public Lights and Under Contracts. (Estimated.) | Private Lights (per Meter). | | |
| Thousands. | Thousands. | Thousands. | Thousands. | |
| *12,156,798 | 465,541 | 10,749,443 | 11,360,826 | 49,000 |
| †11,727,275 | 468,366 | 10,394,589 | 11,001,293 | 49,699 |

* Including 2,491,521,000 cubic feet of carburetted water gas. † June half year, 1906.

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £92,803; oil and petroleum spirit, £36,095; coke, £7485; tar and ammoniacal liquor and products, £79,773; and sundries, £228,173. The figures this time last year were: Coal, £95,193; oil and petroleum spirit, £38,105; coke, £4935; tar and ammoniacal liquor and products, £79,727; and sundries, £250,099.

## BRENTFORD GAS COMPANY.

### Half-Yearly Report and Accounts.

In the report to be presented by the Directors at the half-yearly meeting next Friday, they state that the sum of £94,539 is available for distribution; and they recommend the declaration of dividends, subject to income-tax, at the rates of 5, 12½, and 9½ per cent. per annum on the preference, consolidated, and new stocks respectively.

The Directors regard with great satisfaction an increase in the quantity of gas sold of 6·7 per cent. over the corresponding period of 1906, as showing considerable elasticity in the business of the Company. The consumers now number 30,323 ordinary and 37,678 automatic, as against 29,734 and 32,831 respectively for June half of 1906. They are also glad to be able to report enhanced receipts for coke and tar. They refer to the great and unexpected loss they sustained by the death, on the 16th of May last, of their esteemed and valued colleague, Mr. Frank Morris, who had been associated with the Company for many years, during ten of which, as a Director, the Board had the benefit of his able advice and intimate knowledge of the Company's district and business. In pursuance of their powers, they elected to fill the vacancy Mr. William King, whose experience and services to the gas industry are widely known. They also call attention to another change in the *personnel* of the Board, owing to the retirement of Mr. Howard Charles Ward from the chairmanship. Mr. Ward had presided over the affairs of the Company for 36 years, and his colleagues notify with the greatest regret his wish to vacate this position. They elected Mr. Ulick Burke to take his place. Meantime the staff of the Company has not been without change. Mr. Husband, after 23 years' service, having expressed a desire to be relieved of his duties as Engineer and Manager, the Directors appointed to that office Mr. Alexander A. Johnston, formerly Engineer of the Ilford Gas Company.

The accounts accompanying the report show that the revenue from the sale of gas amounted to £167,051; from meter and stove rents to £17,176; and from the sale of residual products to £34,313—rents and transfer fees making up a total of £218,580, compared with £201,651 in the corresponding period of 1906. On the other hand, the manufacture of gas cost £114,272; distribution, £36,959; and management, £6652—the total expenditure being £173,378, against £158,457. The balance carried to the profit and loss account is £45,201, compared with £43,194 this time last year. The working statements show that 83,625 tons of Newcastle coal and 1,413,154 gallons of oil were used in the production of 1,316,624,000 cubic feet of gas, of which 1,208,816,000 cubic feet were sold and 1,223,816,000 cubic feet accounted for. The estimated production of residuals was: Coke, 52,286 tons; breeze, 6523 tons; tar, 977,542 gallons; ammoniacal liquor, 22,763 butts.

## CELEBRATING THE GAS COMPANY'S VICTORY AT HULL.

### Presentations by Workmen to the Manager and Secretary.

In view of the feeling entertained by the present Government and their followers towards the House of Lords, it will be of interest to notice the proceedings at a gathering of the employees of the East Hull Gas Company which took place at the offices last Friday afternoon, as it amounted to a very hearty approval of the course adopted by the Upper House in rejecting the gas-works purchase clause in the Bill promoted by the Corporation. On hearing of the decision, one of the workmen suggested that presentations should be made to the Manager (Mr. John Holliday) and the Secretary of the Company (Mr. David Wood), as a recognition of the esteem in which they are held. This was taken up with enthusiasm, and the result was that on the above-named day each of these gentlemen was presented with a handsome case containing a beautifully engraved silver sovereign case, match-box, and card-case, together with a gold-mounted walking-stick. There was an enthusiastic gathering of the employees, everyone of whom had subscribed to the gifts. Mr. John Pipes (the Superintendent of the Outdoor Department) returned specially from his holidays to preside at the gathering.

Mr. Benson, an elderly employee, in making the presentation, spoke of the kindly feeling which existed between the heads of the Company and the workmen. He complimented the Manager and the Secretary on the matter they had prepared, which had resulted in so brilliant a success being achieved for the Company. Mr. Benson was followed by Mr. Wood, who next Tuesday will have completed thirty years' service with the Company. He referred at length to the parliamentary struggle with the Corporation, and said that, now that the Company had a new lease of life, they only required the united efforts of everyone to gather an increase of business as the years rolled on.

Mr. Holliday, in the course of his remarks, in acknowledging the gift to him, said they, as a body of men working together, received the possibility of changes with what he was sure was a natural unrest; but they were reaping the harvest of their work. Mr. Wood and he, however, could have done little—and he wished to make this perfectly clear—without the united support and assistance of every department connected with the undertaking. Having referred to the parliamentary fight, he said the municipal authorities and the Company were going to work together as amicably in the future as they had done in the past, as was generously admitted by Alderman Larard in his evidence. Before sitting down, Mr. Holliday mentioned as a fact of interest that the working result of the past six months showed unexampled prosperity on the part of the Company; and he said he felt certain they would have no difficulty maintaining this in the future.

Mr. George Taylor (the retort-house foreman) having added a few remarks,

Mr. J. J. Runton (the Chairman of the Company) referred in complimentary terms to the Manager and the Secretary; remarking that there was not the slightest doubt that if they had gone to the Committee with a weak case they would not have succeeded so well as they had done.

The proceedings closed with votes of thanks.

**The Award in the Poulton-le-Fylde Arbitration.**—We understand that Mr. Graham Harris, M.Inst.C.E., the sole Umpire in this arbitration (see *ante*, p. 114), has made his award, the amount of which is £5681.

**Melbourne Metropolitan Gas Company.**—The profits of this Company for the six months ending the 30th of June were £60,000. A dividend of 5s. per share has been declared for the half year, a sum of £17,500 placed to the reserve fund, and a balance of £2750 carried forward.

**Samlesbury Water Scheme.**—A much-needed benefit was conferred on the township of Samlesbury last Wednesday, by the completion of a scheme by which water is drawn from the Thirlmere aqueduct of the Manchester Corporation. The scheme comprises 13 miles of mains, 11½ miles of which were laid by the Preston Rural District Council, while the remainder were taken over from the Blackburn Corporation, who, on establishing their sewerage works in the district, laid a main and built a meter-house. The work has cost something over £4000. The opening ceremony was performed by Mr. W. Pye, the Chairman of the Council, who turned on the water with a key presented to him by Mr. H. Heaton, on behalf of the Engineers (Messrs. Myres, Veevers, and Myres).

## NEYLAND GAS ARBITRATION.

An inquiry has lately been held at Neyland, by Mr. W. A. M'Intosh Valon, as Umpire, in the matter of the purchase by the Neyland Urban District Council of the works, mains, and plant of the Pembroke Docks and Town Gas Company, situate within the urban district. The Arbitrators were Mr. Norton H. Humphrys, Assoc.M.Inst.C.E., for the Gas Company, and Mr. Charles E. Baker for the District Council; but, having disagreed, they did not take part in the proceedings. The Company's original claim amounted to £2876 5s. 5d.; but evidence was given on an amended claim of £3003 18s. 3d.—the difference being made up of new services laid and new meters and stoves fixed since the notice to treat was given. The valuation put forward by the Council as the amount expended by the Company on works, mains, and plant within the Neyland district was £1128 1s. 11d. They contended that they were not liable for the additional claim of £127 12s. 11d.; but should the Umpire be against them on this point, they claimed that the amount should be £107 5s. 5d. The Counsel engaged were Mr. Sankey for the Company and Mr. Rhys Williams for the District Council; and the witnesses called on behalf of the respective parties were the Managing-Director, the Manager, the Solicitor, and Mr. C. Stafford Ellery (the Engineer of the Bath Gas Company) for the Company, and Mr. F. J. Warren (Accountant) for the District Council.

## WOLSTANTON AND BURSLEM GAS ARBITRATION.

### The Value of Part of an Undertaking.

At the Surveyors' Institution, Westminster, on Monday last week, arbitration proceedings were opened between the Wolstanton United Urban District Council and the Corporation of Burslem, to determine the amount of compensation to be paid to the Corporation in respect of the mains, pipes, and fittings within the district of the Council, who are taking over the supply of gas in their own area under their Act of last year. The claim was for upwards of £32,000.

Mr. W. A. M'Intosh Valon was Arbitrator for the Corporation; Mr. Corbet Woodall acted in a like capacity for the Council; and the Umpire was Mr. A. J. Ram, K.C.

Mr. J. D. Fitzgerald, K.C., and Mr. R. S. Clease (instructed by Messrs. Sharpe, Parker, and Co., of Westminster, and Mr. A. Ellis, Town Clerk of Burslem), appeared for the Corporation; and Mr. E. Honoratus Lloyd, K.C., and Mr. C. C. Hutchinson (instructed by Messrs. Batten, Proffitt, and Scott, of Westminster, and Mr. E. Hollinshead, the Clerk) represented the Wolstanton Council.

Mr. Fitzgerald, in briefly opening the case, said there were several heads of claim, the first being for the value of the mains, pipes, and other works; and on this they would hear, from the evidence of the Engineers, that they were in most excellent condition. Another head of claim was for damage for severance (under section 63 of the Lands Clauses Act), loss of interest, establishment and management charges, &c. A third head raised a point of law as to the loss of the supply in the district, and the consequent loss of revenue. This was the largest head of the claim.

Mr. *Charles Hunt*, examined by Mr. Clease, submitted figures to show that the average rate of increase in the consumption of gas in Burslem for the past five years was 1·59 per cent. per annum. Taking this figure, he estimated that the consumption of 26,114 000 cubic feet of gas would not be overtaken by the increase in Burslem in less than 8½ years, during which time there would be the loss of interest, diminishing, of course, yearly. Calculated at the rate of 4 per cent. per annum, the loss of interest totalled up to £1107. As to the management and establishment charges, those which might be regarded as of a permanent nature came to rather more than 1d. per 1000 cubic feet of gas sold, or (say) £110 per annum on the standing consumption. This again would be a diminishing figure, and he put it at £484. The 10-inch main from the works to the boundary of the district was used to supply Wolstanton as well as a small portion of Burslem *en route;* and this, to a very great extent, would be rendered unproductive. He estimated the value of the loss there at the difference in cost between a 10-inch and a 4-inch main. This was about 7s. 2d. per yard; and 450 yards worked out at £161 5s. These three sums made together £1752 5s. With regard to the loss of revenue, he took the published accounts of the Corporation, and they showed that the balance carried to profit and loss account for the year 1907 was £11,832. This was after deducting expenditure upon maintenance of works, plant, mains, meters, services, and stoves at the rate of 6·38d. per 1000 cubic feet of gas sold, and also £992, the cost of the opposition in the Wolstanton case. The proportion of the £11,833 which he attributed to Wolstanton was £1508. He based this figure on the consumption. Capitalized at 4 per cent., it represented a capital value of £37,700. From this sum he deducted the value of the mains, pipes, and other works to be taken over by the District Council—£11,388—also the £1752 and the value of the works at present in use for the supply of Wolstanton, estimated at £5876. Deducting these three sums, which he made £19,016, he got a total of £18,681. The heads of his valuation were: Value of mains, pipes, and other things, less depreciation on meters and stoves, £11,388; he added 10 per cent. for compulsory sale, £1139, making £12,527; and then he added for damage resulting from temporary reduction of consumption and mains thrown out of use £1752, and for reduced profit £18,684—making a total of £32,963.

In cross-examination by Mr. Honoratus Lloyd, witness said the claim was intended to be for £32,000 odd. When he gave £37,700 as 25 years' purchase of the Wolstanton revenue, he deducted the amount of the other claims. If in law they were entitled to mains, pipes, and fittings, he claimed first of all the item of £11,388, *plus* £1752 for severance damage. On the other basis in law, he claimed £18,684. Asked on what basis he claimed the two, witness said if the Corporation asked for profits alone, the claim would be £37,700, less the value of the works left on their hands, which he put at £5876. His claim on that basis would be roughly £32,000. This was on the basis of his claiming goodwill; and it was practically a claim for goodwill. He had not allowed anything for depreciation of mains or service-pipes, because they were in excellent condition.

Mr. Honoratus Lloyd: With regard to other items, for "Enforced idleness of works," you have given us £225 per million cubic feet output—£5876 on the 26 millions in Wolstanton. I observe by the figures you have put in that the Burslem increase has varied; for instance, between 1903 and 1904 nearly 10 millions. Do you know to what that was due?

*Witness:* I do not know; fluctuations naturally occur.

In further cross-examination, witness said he had taken the rate of increase at 1·59 per cent. per annum over five years from 1902 to 1907. He had not calculated what it was between 1903 and 1904. It would be considerable if in that year they went up nearly 7 millions. If this occurred again, he admitted that their idle works would be pretty well employed; but they had to reckon on an average of years. As to loss of revenue, the accounts were made up to the 31st of March this year; and they showed an expenditure of more than 6d. per 1000 cubic feet for repairs and maintenance, and also the expenses of opposing the Wolstanton Gas Bill, £929. After these deductions, there remained £11,832. The item of £1508 was the percentage of consumption in Wolstanton applied to the total; and he had taken 25 years' purchase on this. He had based it upon the percentage at which they had lately been able to raise their loans—the last loan being at 3⅞ per cent. The Corporation raised their loans on the total rates.

Mr. Honoratus Lloyd: So you take the income of the gas-works as well secured because the Corporation can levy money on the security of the whole rates at a certain percentage. Is that what you mean?

*Witness:* I say that is the amount which they have to pay for their loan. Therefore it seemed to be a fair amount at which to capitalize these profits.

What we are doing for this purpose is to ascertain the capital value of their gas profits. What has that to do with the price they pay for their loans?—It is always more or less based upon the value of money at the time, and that is the value of money to them.

But first of all we have to deal with the security of their gas income. The price at which they raise their loans on all the rates is very little affected by the security of the gas undertaking?—That is rather favourable than otherwise. I might have asked a greater number of years' purchase.

What I want to get at is this: How does the price at which they can borrow money, except as being some evidence of the state of the Money Market, affect the security of their gas undertaking?—I do not think the price at which they can borrow money does affect it, but it does affect the value of an undertaking—the value which they would pay for it.

But just suppose for a moment that they made no profit on the gas-works, do you think they would not raise the money at the same rate?—I doubt if they would.

To what extent do you think it would affect it?—They would have to pay a higher rate, I suppose. I can imagine, if they had no revenue out of which to pay their interest, their borrowing powers would be limited.

That is not the point. They have the whole revenue of the rates upon which they could borrow. Whether the gas undertaking is a success or whether it is a failure, they have the security of the rates just the same. And it is upon these rates that they borrow. Can you give me any reason beyond that why you are taking 25 years' purchase?—No; I based it upon the value of money.

In further cross-examination, witness said that Chard was one of the gas undertakings in which he valued on the revenue. He put it at 19 years' purchase; but that was a non-statutory concern. In the case of Nantwich, which was also a non-statutory undertaking, he gave 19½ years' purchase. He could not say what difference he would make between statutory and non-statutory concerns—he could not give the number of years; but he should think it would be about five. This was what he generally did. The rest of his valuation was merely a deduction from the £37,700; 26 years' purchase and the two former figures he had given. He arrived at the £5876 by an estimate. It worked out at £225 per million cubic feet of gas; and this was a fair figure for works of the size of those in question. Within limits, the larger the works, the cheaper they were. The 10 per cent. on mains, pipes, and fittings was intended to represent compensation for compulsory purchase, which he understood to be the case here.

Mr. *Arthur Valon*, examined by Mr. Fitzgerald, said he had made a valuation of the works concerned, and arrived at a total of £34,266. As to the item "Works thrown out of use," he had taken the quantity of gas sold in Wolstanton in the last years—26,114,000 cubic feet—and multiplied this figure by £250 per million as the structural value of the works and plant of the Burslem Corporation thrown out of use by the sale. Then he calculated that it would take 8½ years to make up the above-named consumption. He had discounted each year the value for the length of time which they they would have to wait until the increase in Burslem itself made up the gas lost. Having gone through other details, witness said he had dealt with the diminished profit in exactly the same way as Mr. Hunt had done; and he agreed with him that the mains were as good as new.

In cross-examination by Mr. Honoratus Lloyd, witness said his figures were substantially the same as those of Mr. Hunt. He had not allowed depreciation anywhere, because taking the whole of the claim together, the depreciation was charged against the revenue before arriving at a profit. If he allowed depreciation on the first item, the amount claimed under the head of "Payments" would be larger; so that it made no difference.

Mr. Honoratus Lloyd: What I am going to put, as a matter of law, is that we have nothing to do with profits. All we have to do is to buy the depreciated mains and fittings.

*Witness:* If you want depreciation, I think 10 per cent. on meters and stoves is sufficient to cover it.

Mr. Hunt gave us 20 per cent. on one and 25 per cent. on the other. You have, in fact, taken off a larger sum for the profit?—It makes no difference. If I take 20 per cent. off for meters and stoves, it would simply be taking it off that item and putting it under the same thing as profits.

Mr. WOODALL: Have you increased the amount for renewals?

*Witness:* The amount allowed under the head of "Repairs and maintenance and renewals" is sufficient to repair and renew the whole of these works. If I allow a certain deduction from the structural value, I must deduct a corresponding amount from the maintenance in the account before arriving at the profit made.

Mr. VALON: Then you have not made any addition to the amount actually spent by the Corporation in their renewals?

*Witness:* No; because there is already sufficient in the account to cover repairs and renewals.

Mr. HONORATUS LLOYD: Why do you put 10 per cent. for compulsory purchase?

*Witness:* Because we are going to add 10 per cent. for compulsory purchase under the Lands Clauses Act, on the structural value of the works.

It seems to me you must be wrong one way or the other. Your claim is upon the goodwill basis; but you have put down diminished profit. If you claim 10 per cent., you are claiming it upon that.

Mr. FITZGERALD: He is not claiming 10 per cent. upon the diminished profit.

Mr. HONORATUS LLOYD: I want to see on what principle he has acted. [To witness:] Though it is a goodwill basis, you have not asked for any percentage upon the goodwill, but you have asked for 10 per cent. upon the structural value?

*Witness:* It comes to the same thing.

Mr. HONORATUS LLOYD: Therefore it is goodwill pure and simple; and in arriving at the goodwill, you have taken the structural value, and then you have taken 10 per cent. upon that.

Mr. FITZGERALD: If it will oblige you, we will put it on to the other. I think the case is very simple that is before you now.

Mr. HONORATUS LLOYD said he would address the tribunal very briefly, call his evidence, and complete his case. The main point was the point of law; and upon this his learned friend desired that the Umpire should state his award in the form of a special case. Therefore, if he proposed to do this, he need not argue the matter.

The UMPIRE said that he should like to have the assistance of both learned Counsel. They were aware that the value had to be ascertained by a certain day. He took it, if he stated his award in the form of a special case, by so doing he would comply with the terms of the statute that the amount must be ascertained on a certain day, even though he did it in the alternative. He asked whether this was the opinion of Counsel.

Mr. FITZGERALD said the words were "shall be determined by arbitration within twelve months from the passing of this Act."

The UMPIRE: Is it sufficient determination if I state an award in the alternative, subject to the ruling of the Court upon the alternatives that I submit to them?

Counsel on both sides agreed to let the point go on the lines that were suggested.

Mr. HONORATUS LLOYD said he need not trouble the tribunal on the question of law, because he would have to address the Court hereafter if the Umpire put the award in the form of an alternative.

The UMPIRE asked Counsel to state the precise form in which he desired him to raise the point.

Mr. HONORATUS LLOYD said that he would raise it in this way: His learned friend had put in a claim which, in form, he was bound to say he did not understand. It was not an alternative claim to start with; and that was why he ventured to suggest it was not clear. He thought his learned friend, if he wanted to raise the point, would have said: "I am going to claim upon a goodwill basis," and then leave him (Mr. Lloyd) to raise the point as to mains, pipes, and fittings; or he would have said: "I am going to claim in the alternative one way or the other." But the claim was neither, and seemed to be a mixture. What he was going to put was this—that, upon the construction of the two Acts, what he had to buy and pay for was the mains, pipes, and fittings. Then it seemed to him, by the way in which his friend had framed his case, that there might be possibly three alternatives. He might say: First alternative, mains, pipes, and fittings pure and simple; second, mains, pipes, and fittings, *plus* compensation for severance (physical severance—the items given as to the 10-inch mains, and so on); and, third, the goodwill basis. His (Counsel's) contention was, first, mains, pipes, and fittings purchased only; secondly, it could only, at the worst, from his point of view, be mains, pipes, and fittings, *plus* physical severance, and under no circumstances could goodwill or allowance for loss of profits be made. This being so, the way he supposed it would have to be raised was to have the award in the form of the alternatives. So far as his first point went—mains, pipes, and fittings value—he was not going to trouble the tribunal with more than a few words; because it was idle to discuss the question of 2d. and 3d. per yard for laying pipes. The real question between them was whether or not depreciation should be allowed when they were purchasing pipes which varied from one up to forty years of age. He was bound to say he thought, after Mr. Valon's evidence, it was admitted that depreciation must be allowed, if an admission was required. With reference to the depreciation on meters and stoves, the percentage was common to them both. The other side said 25 per cent., and so did he; and the result was that, while their figure for structural value of mains, pipes, and fittings came out, according to Mr. Valon, at £12,500 odd, and according to Mr. Hunt at £11,300 odd, his (Mr. Lloyd's) figure was about £8000 odd. He submitted that, at the utmost, the other side could not be entitled to more than any loss they might suffer by physical severance; and that they were entitled only to the actual price of the mains, pipes, and fittings as awarded in the Kirkleatham and Wakefield cases. Counsel proceeded to deal with the claim in respect of the loss of interest diminishing year by year, but extending over 8½ years for the capital expended in such part of the works as was necessary to give the supply, and also with the management and establishment charges. He next examined the main claim—the loss of revenue—to which he said he objected altogether in law. If there was a claim for goodwill, as this was, pure and simple, then if they wanted a percentage they should have had the courage to say they required 10 per cent., 5 per cent., 2½ per cent., or any other percentage. Why should they ask for 10 per cent. on the structural value? It was inconsistent with either of their cases; and he did not dilate upon this because his case was that they were not entitled to 10 per cent. upon anything. If they obtained his figure of £8000 odd, or their figure of £12,000 odd, for the works, or something between these figures, they would certainly obtain all they were intended to have when they took over the works under the terms of the Act.

The following evidence was then given for the District Council.

Mr. *Henry Woodall*, examined by Mr. HUTCHINSON, said his firm (Messrs. Corbet Woodall and Son) supported the Bill of the Wolstanton District Council in Parliament, and he had an intimate knowledge of the undertaking. He had recently been laying mains in Wolstanton, and had prepared a valuation in which he based his figures upon the actual prices they had paid at the present time. He had taken 20 per cent. depreciation on mains, and this was based on experience he had had of the mains in the Chesterton district, which was part of the Wolstanton area. It was a reasonable figure. He had taken 33⅓ per cent. as regarded service-pipes. As to stoves, 25 per cent. had been agreed upon; and on meters he had taken 20 per cent. His total valuation amounted to £8041.

In cross-examination by Mr. FITZGERALD, witness said, with regard to the mains, he did not base his depreciation altogether upon his Chesterton experience, which would have led him to take a larger amount. He had not seen the Wolstanton service-pipes, nor the mains in the town; but he had had the latter examined in a large number of places. He was not prepared to say that they were not in good condition; but he differed entirely from Mr. Hunt when he said that they were as good as new.

Mr. *E. H. Stevenson* said he had made a valuation of the mains, pipes, and fittings, and his summary showed a total of £8025. He had added 5 per cent. for special pipes, against 10 per cent. taken by the other side. He took the depreciation on mains as 20 per cent., which was in accordance with his experience. The number, size, and make of stoves were all obtained from the other side, with the curious result that they (the Council's witnesses) had really allowed more for depreciation. He divided the meters into the ordinary wet, dry, and slot; and he then deducted the 20 per cent. He had taken the average cost of service-pipes at 10s., which was ample. He took the depreciation at 33⅓ per cent., which was in accordance with his practice. The total amount of his valuation came to £8335.

Mr. *Bennett Parkinson* gave evidence as to the opening of trial holes in Wolstanton with the object of inspecting the mains and services. He saw the older mains were rusty; but the new ones looked smooth. He could not say he noticed that any were corroded. The general impression was that their condition was fair; but they certainly looked their age. The services were supposed to be enclosed in troughs; but for the most part they had never been in them.

Mr. HONORATUS LLOYD having stated that he did not desire to further address the tribunal,

Mr. FITZGERALD contended that the Corporation of Burslem had submitted their case in such a way that separate judgments could, if necessary, be given on each of the three heads of claim; and he thought his friend ought to have been grateful to them for so doing. Counsel proceeded to argue upon the separate heads of the claim. He said the only question before the Umpire was the number of years' purchase; and on this there was no conflict of evidence. He therefore asked that 25 years' purchase should be declared a reasonable amount.

The UMPIRE inquired under what head Counsel asked for any amount in respect of what had been described by Mr. Fitzgerald as "loss of revenue," and by Mr. Lloyd as "goodwill."

Mr. FITZGERALD replied that he should say "in respect to the loss of revenue from the township of Wolstanton," the right of supply of which was, by the terms of the Act, taken away from the Corporation of Burslem and transferred to the Wolstanton Council.

The UMPIRE remarked that the three points raised by Mr. Lloyd had been dealt with by Mr. Fitzgerald. As to one, there was no dispute; but with regard to the others, there was.

The proceedings then terminated; and the amount of the award will be announced in due course.

## SEAFORD GAS PURCHASE QUESTION.

### Ratepayers Decide against the Proposal.

Last week, a public meeting of ratepayers was held at Seaford, to consider the advisability of the Urban District Council promoting a Bill in the next session of Parliament to acquire the undertaking of the Seaford Gas Company.

The gathering was presided over by Mr. W. P. Morgan, the Chairman of the Council, who explained that the gas undertaking was a private concern, without statutory powers, and so laboured under certain disadvantages. So as to improve their position, some months ago the Company decided to apply for a Provisional Order, which, if granted, would give them certain statutory powers, and materially strengthen their position. Among other things, of course, it would give them a monopoly of the supply of gas in Seaford and district. The Company accordingly drew up a draft Provisional Order, which they submitted to the Council for approval. To several of the clauses the Council strongly objected—more particularly to those in which the capitalization of the Company was placed at a figure which in the Council's opinion was much too high, and in which the maximum charge was placed at 5s. per 1000 cubic feet. These and other clauses the Council considered would be detrimental to the best interests of the ratepayers; and they opposed the Order. In consequence of this opposition, the Company dropped their application for an Order; and the Council then considered the advisability of promoting a Bill in the next session for the purpose of buying the undertaking. In doing this, they were merely acting upon powers which were granted to urban district councils of buying up, or promoting Bills for the purpose of buying up, any gas or water company; and, of course, the Company must have known perfectly well that they were liable at some time to be bought up by the Council. The Council were also acting upon a clause in the draft Provisional Order, in which the Company said that if within the next five years the Council, *bonâ fide*, promoted a Bill in Parliament for

the purpose of buying up the undertaking, the Company would not oppose, but would sell at a price to be fixed by arbitration if the parties could not agree as to terms. The General Purposes Committee of the Council, after carefully considering the question, recommended the Council to promote a Bill, because they believed that the undertaking could be worked at a profit, and the profits would go to the relief of the ratepayers in some form or another. The Council adopted the report of their Committee, and decided to promote a Bill, provided the ratepayers gave a favourable opinion on the proposal; and the present meeting was called to test this feeling. The Council were actuated by no feeling of hostility to the Gas Company; but being, as it were, trustees for the ratepayers, they considered they would not be doing their duty if they did not draw attention to the opportunity that now offered itself to acquire the undertaking at a reasonable price—certainly at a more reasonable price than it would ever be possible to acquire it in the future. He concluded by moving a resolution in favour of the promotion of the Bill.

This was seconded by Mr. Plaister and supported by Mr. Fuller; and then the opposition took the field. Mr. Barraclough (the Chairman of the Company) said the Company would not be willing sellers; and the purchase clause was only inserted in the draft Provisional Order because the Chairman stated that the Council would not assent to the Order without it. Therefore the buyers would be liable to pay 10 per cent. for compulsory purchase. In Sussex, Surrey, Hampshire, and Kent there were about 93 gas undertakings, and 88 of those were run as private concerns, while five were run by the local authorities. The average price of gas of the 88 companies was 3s. 6d. per 1000 cubic feet; but the average price charged by the five local authorities was 3s. 8½d. That was municipal trading. In his opinion, the Council would have shown their wisdom if they had lain low until the Company had got the price down to 4s., and then have bought them out. That was what they ought to have done. A Ratepayer: We should all have been dead before that happened. Mr. Barraclough retorted that a resolution was passed by the Directors three months ago to reduce the price of gas in Seaford; but it could not be put into effect owing to the abnormal increase in the price of coal. The Council, he added, had for the moment plenty to do to get the town into a proper health resort. They had had the water question, and had a "little bit of a rap" over that. They did not want another. It was by no means certain that if they applied for their Act they would get it. A case was settled a fortnight ago in which the Hull Corporation went to Parliament with a Bill to purchase the East Hull gas undertaking. It passed the House of Commons; but the House of Lords threw it out. The consequence was that whatever this had cost the ratepayers would have to pay out of the rates.

The next speaker, Mr. Hadlow, said the gas was bad; and at his hotel the guests carried their candles down to table d'hôte. One lady, referring to the gas, said: "What a lot of Roman candles you have in the house." The gas gave three military salutes, and out it went. It was most polite gas. Mr. Hooper remarked that he did not agree with his colleagues on the Council in regard to this question. In the Act of 1870, there was a clause which said that in the event of putting up new holders or new works other than the present ones, they would require the consent of the tenants and owners of houses and land within 300 yards' radius. If they bought the undertaking, did they think the Trustees of the Crook Estate, which nearly bounded the works, were going to be friendly and say "Yes"? This was the weakest point of the Company's Order, because it was difficult to get their own tenants to consent to an extension of the works. The Seaford West Company were, he believed, favourably disposed towards the purchase; but would they give the Council *carte blanche* to extend the works? Did those present think it was likely? The consequence would be that, if they bought the undertaking, they would not be able to extend the works, and they would have to be shifted. This would be a grave difficulty for the Company; but if the town purchased the undertaking, it would be a grave difficulty for the ratepayers. He was followed by Mr. Hutchings, who remarked that an important question to be considered before deciding to purchase was the state of the works and of the mains, some of which were laid 20, 30, or 35 years ago. They might take it from him that they would not get an arbitrator to go into the details of the mains. He would take a general view of the affair, and base his result on the profit of the Company, which would mean a large outlay for the ratepayers. Mr. Jack, who supported the resolution, mentioned that the Company refused to allow the Council's Engineer to inspect the works; but this Mr. Barraclough denied. He added that, in the event of the Council allowing the matter to drop, he would propose a resolution at the meeting of Directors that a reduction should be made in the price of gas from September next.

Several other speakers joined in the discussion; and then the resolution was put to the meeting. Only a few, however, voted for it; and the Chairman declared it not carried.

**Increased Cost of Coal at Birmingham.**—Dealing with the subject of the rise in the price of coal, Mr. G. Hampton Barber, the Secretary of the Birmingham Corporation Gas Department, has informed a representative of the "Daily Post" that the additional cost will, on the average, be a little over 2s. a ton; and this, on the amount of coal carbonized, represents an increased charge of over £50,000. An additional income, however, will be derived from coke and other residual products. It is also expected that a larger amount of gas will be sold; while some economies are to be effected. These considerations afford the Committee hope that, without advancing the price of gas, the contribution of the department of £50,000 in aid of the rates will be maintained. This, our contemporary adds, will be very gratifying to the ratepayers, especially when it is remembered that during the past year the average price charged by the Corporation for gas was the lowest in the history of the undertaking. It is explained that the coal contract year does not run concurrently with the financial year—the latter ending on March 31, the former on June 30. For three months of the present financial year, therefore, coal was secured at the lower rates under the contracts entered into by the Gas Committee in 1906.

## GAS WORKERS' STRIKE AT LIMERICK.

Limerick has been the scene of a strike of gas workers which has caused a considerable amount of inconvenience, without apparently any compensating advantages to anybody. The trouble began, it is stated, last Thursday week, when the Manager (Mr. Henry Hawkins) told a carpenter to shift a ladder which was leaning against a new purifier-house. The carpenter took no notice; and the Manager repeated the request to the man's brother, who followed, and who called out: "Tell him to get a labourer to do it. It is not joiners' work to be shifting ladders." The Manager asked why such a remark was made, and said he would remember it. As a result of the dispute which followed (in the course of which the Manager said the man first in fault had told "a lie"), the original offender was suspended. But next day he called at the works and persuaded a deputation to go with him to see the Mayor, who told them they had no case. Then followed the strike; the men declaring that they would all act together till the whole thing had been thrashed out by the Gas Committee and themselves. Among the conditions set out by the men on which they would return to work was the "discharge of the Saxon;" but this was soon dropped, and ultimately the men expressed their willingness to let bygones be bygones if they were paid for the time lost.

So things went on until last Tuesday, when the Gas Committee unanimously decided to give notice to the workers that unless they resumed their occupation at once, or first thing the following morning, the Committee would, in the interest of other industries in the city thrown, or about to be thrown, idle, be reluctantly compelled to employ other people to carry on the work. They expressed the hope that the men would realize at once the misery and want that would fall on the poor of the city if their bread-winners were deprived of employment. Then followed a long list of firms who had intimated that unless their usual supply of gas was immediately restored they would be obliged to close down their works and disband the hands. The Committee also drew attention to the difficulty of caring for the insane at the asylum. The men thereupon returned to work; and the supply of gas was partially resumed at noon on Thursday. Since the previous Friday, nearly all the streets had been in darkness (the exceptions being those electrically lighted); and the loss from a trading point of view must be very heavy. One outcome of the strike was the fitting of an electric motor for the printing of the "Limerick Chronicle," in place of the gas-engine previously employed for the purpose.

## GAS AND WATER ADMINISTRATION AT BARRY.

The decision of the Barry Gas and Water Committee (recorded in last week's "JOURNAL," p. 266) to recommend the Council to place the two undertakings under one Manager, and to determine the engagements of the Gas Manager (Mr. F. M. Harris) and the Water Manager (Mr. E. W. Waite) caused quite a sensation in the town; and on Monday evening of last week a largely attended public meeting of ratepayers was held to consider the matter. After several suggestions had been dealt with, a resolution was carried without a dissentient, to the effect that the meeting observed with concern the proposals of the Gas and Water Committee to discharge Messrs. Harris and Waite, and to appoint one Engineer in their place; and believing that this was contrary to the best interests of the town, and to the report of the expert Engineer called in by the Committee, the meeting felt grave urgency should be shown before the recommendation of the Committee was adopted. Mr. Davies urged that Mr. Porter, the expert engaged, made no reflection whatever in his report on either of the officials concerned. On the contrary, he described the distributing plant as being in an efficient state, but said that the establishment was undermanned. Several of those present paid a tribute to the faithful and efficient services to the town which had been rendered by both Mr. Harris and Mr. Waite for a great number of years; while, on the other side, it was pointed out that the Committee had had the question under consideration for the past three or four years, and that some respect should therefore be had for their opinion and judgment.

The following day, a special meeting of the Urban District Council was held, when the Committee's recommendations regarding the placing of the two departments under one Manager, and the terminating of the engagements of Messrs. Harris and Waite, were agreed to. The recommendation that a Manager for the joint departments should be appointed at a salary of £400 a year was, however, referred back.

Speaking on the proposal to dispense with the services of the present Gas and Water Engineers, Mr. Hogg said he had studied carefully and seriously the report of Mr. Porter, and found that, while it criticized the Committee, it did not contain a word of criticism or condemnation of either of the Engineers. Both these gentlemen had been Engineers of the concerns ever since Barry was Barry; and there had never been any suggestion that they had ever done anything underhanded—nothing of a shameful nature—no suggestion that they had received commissions, or rebates, or anything of that sort. He was pleased to say this to the credit of every member of the official staff of the Council. What were the charges against the Engineers? One of the charges against the Gas Engineer was that he had used a high-priced coal when a low-priced coal would have done; and that the high-priced coal had not produced more gas than the inferior article would have done. Mr. Harris surely could not be blamed for the coal which had been bought; for he was acting under the direction of the Committee, whose business it was to determine the matter. It was true they had not had the tests which they had asked the Gas Engineer to carry out; but it should be borne in mind that the Engineer's first and foremost business was to make gas. As a matter of fact, Mr. Harris had made several tests; but the coal used had not proved a success, and he had had no time, owing to the great demand there was for gas to supply the town, to complete further tests which he had been asked to make. He hoped it was not necessary for him to prove that the Engineers had not done anything wrong. There was no charge of misconduct in any way brought against them. Their

work had been a success; and they had carried out their duties with honour and probity.

At the conclusion of the meeting, Mr. Hogg gave notice to move the recision of the Council's resolution approving of the recommendations of the Gas and Water Committee.

## FATAL ACCIDENT AT MANCHESTER.

The Bradford Road works of the Manchester Corporation Gas Department were last Tuesday the scene of an accident by which one workman was killed, and the lives of two others were placed in jeopardy.

It is stated that at eleven o'clock in the morning, two men named Prior and Bell started off to test one of the syphons—a job which the regulations stipulate shall always be undertaken by two men together—and the former went to the pit, some 3 or 4 feet deep, and took out the plug for the purpose of dealing with any obstruction. He did not, however, immediately replace the plug, and the escaping fumes rapidly overcame him, and he fell with his head in a pool of water. Bell, who was close to the pit, at once went to the rescue; but he, too, was overcome, and collapsed at the side of his mate. An alarm was at once raised, and in a few moments the foreman, William Surrey, arrived. He tried to reach the two men; but by this time the fumes were very powerful, and he, too, fell down insensible. A large number of workmen gathered round the place; and at last the three men were drawn out. The men finally stopped the rush of gas by putting waste into the hole from which the plug had been taken. A doctor was quickly on the spot; but Prior was beyond human aid. The other two men were removed to the hospital; and although for some hours they were in a critical condition, they were by night reported to be out of danger. This is the first serious accident of the kind that has taken place at the Bradford Road works. All three were skilled workmen and knew exactly what to do. The great bravery shown by Bell and Surrey in their attempted rescues is the one bright feature of a sad occurrence. They exhibited that spirit of heroism which is so very frequently witnessed in connection with industrial accidents, and which leads men, without a moment's hesitation, to rise to the noble height of placing their comrades' lives before their own.

The inquest was held on Friday, when a verdict of "Accidental death" was returned; a few suggestions being made by the Jury for the better safeguard of the workmen. Mr. J. G. Newbigging, the Chief Engineer, said that deceased was used to this work. The plug had to be unscrewed until there was an issue of gas, which denoted that the pipe coming from the main was clear of obstruction. If the pipe was found to be clear, the plug had to be screwed tight again. This was done twice a day for testing purposes. If the pipe was not clear, it was the men's duty to report it to the foreman. There were always two men together when the testing took place. If the pipe was clear, there was no necessity for the entire removal of the plug. It was against the men's instructions to remove it. It was the foreman's duty to clear any obstruction. There was no risk whatever when ordinary precautions were taken. There had been no accident of the kind at the works before; nor had he heard of any such accident elsewhere. In the face of this occurrence, however, they would certainly do something to make it even safer for the men. The foreman, Surrey, said deceased had been entrusted with the duty of testing the syphons for about eighteen months. Two men were always together when it was done. They reported to him when they found an obstruction; but they had authority to clear it—he had allowed them at times to do so. If the plug was taken out, a piece of cotton waste would stop the gas from escaping while the work of clearing the pipe was on. The men had appliances for use in case of emergency. If the waste had been used on this occasion when the plug was out, there would have been no danger whatever. The Coroner remarked that the most cheering feature of this unfortunate accident was the brave attempts made at rescue by so many workmen; and he congratulated them on their plucky conduct. If blame was attachable to anyone at all in connection with the accident, it was to Prior himself; for he had neglected the very necessary and obvious precaution of packing with waste the hole where the plug had come from, so as to prevent an escape of gas.

## Projected Electric Lighting Demonstration in the City.

At the meeting of the Court of Common Council last Thursday, it was unanimously resolved, on the recommendation of the Streets Committee, that certain proposals for demonstrating improved electric lighting in several of the main streets of the City should be accepted. They were as follows: By the City of London Electric Lighting Company, on the Holborn Viaduct, by means of flame arcs on standards; in Farringdon Street, including part of Old Bailey and Holborn Circus, by enclosed arc lamps; and in Newgate Street, by smaller lamps. The charges for these lamps are to be at the rate of £17 10s. per annum each for the flame arcs, instead of £26 per lamp; and for the smaller lamps £12 10s. and £10 10s. each per annum respectively. By the Charing Cross and Strand Company, in Cannon Street (between St. Paul's Churchyard and Budge Row), by means of centrally hung flame arc lamps, at £17 10s. each per annum. The recommendation stated that all costs of the installations, including standards, lamps, maintenance, &c., are to be defrayed by the Companies; that the necessary works are to be proceeded with as expeditiously as possible; and that the demonstrations are to be continued until March next.

**Seeking Gas Escapes.**—During the past week two escapes of gas were located by means of naked lights—with somewhat serious consequences in both cases. A Harborne doctor, suspecting an escape in his sitting-room, took a light to examine the chandelier, when there was a loud report, and both he and his wife were badly burnt about the face and hands. The second instance occurred at Middlesbrough, where a woman, also suspecting an escape, entered the room, opened the window, and struck a match. Windows were broken, furniture damaged, and the woman herself had to be conveyed to the infirmary, where she was detained.

## WATER SUPPLY IN SOUTH OXFORDSHIRE.

### A New Reservoir at Woodcote.

Woodcote, in Oxfordshire, which is situated amid beautiful country, about 8 miles from Reading and 4½ miles from Goring-on-Thames, was last Tuesday the scene of a very enjoyable—and for the locality and the undertaking concerned a very important—function; invitations having been issued by the Chairman and Directors of the South Oxfordshire Water and Gas Company to witness the opening of a new high-service reservoir on Greenmoor Hill. A large number of ladies and gentlemen—about one hundred (many of whom were residents from all parts of the Company's district)—took advantage of the opportunity which was thus offered of combining business with pleasure; and a not inconsiderable proportion of the party travelled down with the Secretary (Mr. F. C. Robus, F.C.I.S.) to Reading, where brakes were in waiting to convey them to the site of the reservoir. This drive itself—though the day was not so clear as it might have been—was quite sufficient to repay one for the journey down from town. Most people, no doubt, place next in their feelings to pride of country, pride of their own particular county; and those who dwell in Oxfordshire are certainly not proud without a cause. Almost the whole of the way, the road led upwards; and by the end of the drive, it was apparent that a considerable height must have been reached. This was confirmed on stepping from the waggonettes; for it was seen that the Company's land was situated at the top of a commanding hill from which one looked down upon the surrounding country. For this reason, the new reservoir has been most appropriately named the "Summit." The Company was originally started in 1888 as the Goring and Streatley District Gas and Water Company, Limited, which places were first supplied in 1892 or 1893. In 1902, powers were obtained to extend the area of supply, under the title of the Thames Valley and Goring Water and Gas Company, Limited; and on June 30, 1905, the Royal Assent was given to an Act incorporating the South Oxfordshire Water and Gas Company, with power to supply a district extending from Streatley to the borders of Henley, and from Shiplake to Newington—an area of something like 150 square miles. Over 50 miles of mains have been laid, varying in size from 14 to 4 inches. Although the undertaking is a large one, the paid-up share and loan capital of the water portion is only £70,473. The plant consists of duplicated pumping machinery, which will lift upwards of 200,000 gallons of water per diem; while the storage capacity is over 3,000,000 gallons.

On arrival, the visitors were taken over the works, under the guidance of the Chairman of the Company, Mr. Henry J. Robus. It may be pointed out that there are two reservoirs, separated by the roadway. The one already in use is covered in; the new one will be similarly treated later on in the year. The Directors, however, were anxious to be quite on the safe side with regard to the summer's requirements, and so decided to bring the second reservoir into operation, and postpone just for the present the covering in. The work of construction was not accomplished without difficulty; inasmuch as after excavating the clay for some distance, a bed of sand was met with, which necessitated going down 10 or 12 feet deeper than had been anticipated, in order to secure a sound foundation. The capacity of the new reservoir is 2,650,000 gallons; and it has a partition running down the centre, so that one-half at a time can be cleaned, without emptying the water out altogether. It was constructed almost entirely by the Company's own men; and during the whole of the operations not a single workman (of whom at times over a hundred were employed) suffered any kind of accident. The Company are the freeholders of about 12 acres of land; and there is space still left for the building of two more similar reservoirs. The water is pumped from a well at Goring to Cleeve, which supplies Goring and Streatley, and is lifted from there to Woodcote, a distance of 3¼ miles; the reservoir being 620 feet above sea-level. Fortunately for the low-lying parts of the district, the pressure is so great that water can be thrown over the houses without the aid of a fire-manual. As regards the "Summit" reservoir, it may be remarked that it is a most substantial structure; and the cost has been extremely moderate—well under £15,000, including the land. The water has been shown by analysis to be of an admirable character—free from pollution by animal organic matter, and an excellent supply for drinking and domestic purposes.

When the party had assembled round the valve-house, the Rev. Mr. Nind offered a short prayer, after which Mrs. Henry J. Robus handed Sir Robert T. Hermon Hodge, Bart., a gold key, suitably engraved, with which he opened the valve-house prior to turning the water into the main. In doing so, he expressed the hope that this great undertaking would last for very many years for the benefit of the community for whom it had been built. The company then proceeded to the other end of the reservoir, on the outside wall of which, facing the public road, was an inscription stone. This was unveiled by Mrs. Robus, after which Sir Hermon Hodge presented her with a gold buckle in the shape of the reservoir. The buckle had upon it the words: "Presented to Mrs. Henry Robus, at the opening of the Summit Reservoir, Woodcote, Oxon.; 1907."

After the services of a photographer had been requisitioned, a move was made to a large tent which had been erected on the ground; and here the guests were hospitably entertained at luncheon, during which a short toast list was gone through.

Mr. H. J. Robus, after the Loyal Toast had been honoured, proposed "Health and Prosperity to Sir Robert Hermon Hodge."

Sir Robert Hermon Hodge said he could not thank Mr. Robus sufficiently for the kind way in which he had alluded to him. He did not forget that the original invitation which was given him to be there on that most important occasion was given to him at the time when he was Member of Parliament for the division; and he regretted very much that he could not appear before them that day in this capacity. He was, however, one of those who were swept away in the flood which went over the country, and which he trusted had brought with it all that those who effected it had desired. Though he was no longer a Member of Parliament, and so could not be present in an official capacity, they had extended the invitation to him as a private individual. He was only too delighted to join hands with those who had

been engaged in the great work of bringing water into this hitherto waterless region. It was a great pleasure to him while he was a Member of Parliament to do what little lay in his power to help the Bill through and secure the Act under which the Company obtained their powers. He was amazed at the opposition—at the difficulties which were thrown in the way of Mr. Robus and the Directors of the Company by colleagues of his in the House of Commons; and he was perfectly certain that their action was owing to their entire ignorance of the needs of the locality, and of the importance to the inhabitants of a good and pure supply of water. He had very often sat in the House of Commons and heard Members for the Metropolitan district talking about water famines in London—taps only running for two hours a day, and so on—and thought that if they could only come into the region he was acquainted with, where there where no taps, and people were dependent for their water supply on ponds which dried up in the summer, and where he had often seen carts go to the Thames for water for both people and cattle, they would then know better than they did what the meaning of a water famine really was. This was a locality where they were suffering from a permanent water famine; and they appreciated the fact that the Company were providing them with that necessary of life a pure supply of water. They knew perfectly well, of course, that it was not a Company of philanthropists; and he thought the people of the locality had met the Company on the whole in a friendly manner, and had shown that they were not unwilling to pay a fair price for the water which had been brought under such great difficulties to the summit of this high elevation. He believed the Company would be the means of largely increasing the value of the property in the neighbourhood, as well as of adding to the population; and certainly they would add to the comfort of all those who at present resided in the district. Further than this, he believed they would be the means of providing a great deal of work for those who needed it. After giving particulars regarding the Company, he concluded by remarking that he was sure they would one and all join with him in wishing "Good health and prosperity to those who are engaged in this undertaking, and financial success to the South Oxfordshire Water and Gas Company." With the toast he coupled the name of the Chairman, Mr. Henry J. Robus.

Mr. ROBUS, in responding, said he had been ill for a very long time; and he had looked forward to the opening of this reservoir in the hope that he would be fully restored to health, so that he could give them some of the little episodes that characterized a water company in its early stages, and tell them, not of the little pin-pricks they got, but of the pleasant features. He was happy to say that at the moment they were in affectionate accord with their consumers. They had not a single dispute on hand with them. They were in agreement with all the Parish Councils, Rural District Councils, and the County Council. Not one wry word was to be heard. He considered that the whole of the Councils had met the Company in an excellent spirit; they had extended that help which a young company so much desired. He might point out that he had been connected with the Company since its inception. The first year's revenue was under £5; while to-day it was well over four figures, and in ten years' time—so far as he was able to judge from the past, and looking into the future—he thought he would be able to tell them that it was not four figures, but five figures. They had got along in a first-rate manner. Their water, he might say, was of a most excellent character. Sir Robert was their largest consumer; but they had other excellent ones. He could not tell them quite how many there were; but there were large and small people, and the Company had secured nearly the whole of them. He had also wanted to tell them what happened when they promoted their Bill. He and Mr. Bodkin had interviews with the various Councils; and they found that they were composed of a practical and sensible body of men.

Mr. F. E. BODKIN, a Director of the Company, expressed the hope that Mr. Robus would soon be able to take up his duties again in the energetic style which had been of so much service to the Company. As regarded the ceremony which had been so successfully carried out that day, he thought very few people thoroughly understood the feelings of Directors of water companies. No doubt they, to the public, appeared as directing an undertaking which had an enormous district, and, of course, made enormous profits and paid enormous dividends. To the Directors of the Company, the matter appeared in a very different light. They felt now—and always had felt—the responsibility which Parliament had placed on their shoulders, and which meant that over the very large area of 140 or 150 square miles they were supposed to supply practically unlimited quantities of pure and wholesome water. They intended to live up to the high ideal to which this responsibility pointed; and consequently they had carried out, among other things, the work which had been inaugurated that day. As regarded the quality of the water, analysis had shown that, when the reservoir was filled up to the top, there would not be one drop unfit for human consumption. The quantity, too, was very large—in fact, practically unlimited for the present population. The provision of such a supply was the task they had set themselves to accomplish before they rested satisfied that they had carried out the trust imposed upon them.

The party then broke up, some going to Goring and others to Reading, in the brakes which were in waiting for them.

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**Proposed Water-Works Extensions at Maryport.**—The Maryport Gas and Water Committee have decided to recommend the Urban District Council to apply to Parliament for powers to lay an additional pipe to the mill-race from the Derwent, at the Goat, Cockermouth, and thus double the existing supply, at an estimated cost of £20,000. At present, the water-works yield an annual profit of about £800; so that the proposed additional cutting will, unless more consumers are secured, absorb all the profit. The recommendation was not unanimous; two voting against it, while one was neutral. As an alternative, it was suggested that the town should obtain a gravitation supply from the Dash, a stream flowing from the eastern side of Skiddaw, and so save £800 on pumping from the Derwent. But as this would mean 10 miles more of pipes, and the impounding of the stream at an additional cost of probably not less than £35,000, it was decided to adopt the cheaper scheme.

## CHESTERFIELD WATER ARBITRATION.

### Riparian Owners' Rights and "Adaptability."

Arbitration proceedings took place on the 17th and 18th inst., at the Surveyors' Institution, Westminster, between Mr. Bernard Lucas and the Chesterfield Gas and Water Board, concerning the compulsory purchase by the latter of certain lands at Linacre, Old Brampton, near Chesterfield, required for the purposes of their water supply. The Umpire was Mr. T. T. WAINWRIGHT, the President of the Surveyors' Institution. The Arbitrators were Mr. G. F. BARNES for the claimant, and Mr. F. FOWLER for the Board.

Mr. SUTTON, K.C., appeared in support of the claim; and Mr. A. C. ACWORTH, K.C., represented the Board.

Mr. SUTTON, in opening, said the question was what compensation should be paid to Mr. Lucas for the purchase of a piece of land, which belonged to him, situated on the Linacre Brook, in the parish of Brampton, lying between the Lower Linacre and the Upper Linacre reservoirs. The embankment of a proposed reservoir crossed the Linacre Brook from Linacre Wood, with the result that the new reservoir would be brought very nearly up to the boundary of what was called the Upper Linacre reservoir. A part of the land down to the brook belonged to them; and it was proposed to take 17 acres 16 perches. The question of what should be paid for this involved considerable difficulty. The land was in itself admirably suited for a reservoir. There was good capacity, a splendid watershed, water of excellent quality, and there was great economy on the site. They had only to build the embankment in the valley, partly on the land belonging to Mr. Lucas and partly on that belonging to the Duke of Devonshire; and they would secure an excellent reservoir. This would not be disputed; but there were difficulties of law, and probably also of fact, arising in this case. The question might be raised, upon the construction of the Acts of Parliament, as to whether it was open to the claimant here to take advantage of what was called the special adaptability, in consequence of the Acts previously passed and the rights under them to the Water Board as successors. He would go through the Acts with a view of seeing what their rights were, and to what extent they in any way prevented the claimant from making the claim that his land had special adaptability for the purposes of a reservoir. When this had been dealt with, there was another question of fact as to value from the special adaptability point of view. The predecessor in title of Mr. Lucas not very long ago sold to the Chesterfield Water Board's predecessor (the Water Company), a small piece of land to lay a line of pipes; and the Duke of Devonshire sold an easement in perpetuity. The reason it was taken to the lower reservoir was that this reservoir, having been made a long time ago, was not at the elevation which more recent building operations and developments in population in the area of supply had made necessary. They no longer gave from the lower reservoir a supply such as was required under the Water-Works Act, or that was necessary for the supply of their area. They therefore wanted to get the water from a higher level; and this was why they laid the pipes. He must therefore first of all point out what it was that the Chesterfield Water Board, as the successors of the Chesterfield Water and Gas Company, acquired—what rights they had in the waters of the Linacre Brook, and what rights, if any, in the land which it was now proposed to take; or what powers and privileges they had in the land which would prevent them in law from using it for the purpose of a reservoir. He ventured to think there were none. The Act under which the powers were first given for the creation of a Water Company was passed in 1825. This was before the importance and value of these water rights had become impressed on the Legislature, as they now were. There were not now so many places available for obtaining a water supply. Important bodies had taken steps to secure to themselves pretty nearly the whole of the watersheds in the country. But this state of things did not exist when the Act was passed; and he found, on looking at the Act, that there was nothing in it to give compensation to any person by reason of his watershed being in any way interfered with. After quoting from the 1825 Act, Counsel said the rights were limited to taking water from a spot a mile-and-a-quarter below the westerly embankment of the Lower Linacre reservoir, and supplying it to such of the inhabitants as might desire to take it. There was no exclusive right of supply, nor any power to do more than take such water as came down to the spot in the Linacre Brook and distribute it. As far as he could make out, there was no provision for giving any compensation to the riparian owners above this point for any loss of rights that they had in the river; the only compensation that was contemplated under the Act was to the riparian owners lower down. It was a curious thing that the Act of Parliament, though it had been repealed, was still the foundation of the rights which the Water Board had in this case. The next Act, passed in 1855, was to enable the Chesterfield Water-Works and Gaslight Company to extend their undertaking and powers and area of supply. Though the Act was repealed, the Company were re-established; and they were put practically in the same position as the old Company had been in, with certain increased powers of supply. They were empowered to make a reservoir; and this reservoir was called the Lower Linacre reservoir. As to the Lower Linacre Brook, there did not appear to be any power given to do more than take the waters that came down to them; and there was no interference with the rights of riparian owners above. The Water-Works Clauses Act of 1847 was incorporated with, and formed part of, the Act; and by the former there would be compensation made for any interference with rights. Then came the Chesterfield Water-Works and Gaslight Company's Act of 1865; and again the Water-Works Clauses Act was included. Power was given to construct new works; but he could not see that there was any authority given over the water that flowed between the two reservoirs, nor was there anything to interfere with the rights of persons who were the owners of the soil. The position seemed to him to be different from any which he had met with in his experience. The Acts were very peculiar, and seemed to be unusual. They had not in any way dealt with the rights of

the riparian owners over the watershed. But they had the right to make the reservoir and to use the waters of the brook; and no doubt the riparian owners could not interfere with the brook so as to prevent the water coming down to the lower reservoir. But so long as they preserved the flow of water to the brook, they could do anything they pleased with the land; and as the brook flowed entirely through the land of the Duke of Devonshire and Mr. Lucas, they could, if they pleased, divert it, not using any of the water, and utilize the land through which the brook previously ran for any purpose. They could not interfere with the flow; they could not take away the water except to such an extent as they were using it, or could use it, at the time when the Act was passed. The Chesterfield Water and Gas Company, by obtaining power to make the reservoir, got no more rights against the riparian owners of the land above than any lower riparian owner would have by common law against an owner higher up the stream. There was no compensation to them. Their rights remained undiminished. They were empowered to construct a reservoir or reservoirs and to receive the waters from the brook without making any compensation to those above.

The UMPIRE: What is the effect of that? Supposing no compensation is, or has been, paid to you. So far as you have gone, these Acts give powers for the taking of these waters. Where have you done with that? Do you mean because you have not got compensation?

Mr. SUTTON said they had not been damnified at present; but the Board were going to damnify them now. What he wanted to show was that they had acquired no rights over their lands beyond those which an ordinary riparian owner lower down had against a riparian owner higher up.

The UMPIRE: It is the usual argument referring to value—the user of the land and consequent value.

Mr. SUTTON said that was so. In 1871 another Act was passed. The increase of population and the increase of commercial works again made the supply inadequate; and under that Act power had been obtained to make an aqueduct or conduit, and a conveyance had been obtained from their predecessor in title. The deed showed that their riparian rights were preserved. Land was sold; but this gave the Board no more rights over the brook than they previously had. The claimant still remained the riparian owner, and the brook could not be interfered with without his consent, except under the Act for making compensation. What he suggested was that if there was land of this description suitable for water-works, and a stream running there—which in itself was valuable—it was a very unusual thing to say that a man's land should be taken at less than £100 an acre, and that he should be cut off from his own stream. It could not be said that they were to take away a man's riparian rights and give him no more than agricultural value. He thought they were entitled to say that, in taking this valuable land, they must pay that reasonable compensation which the riparian owner would expect, and undoubtedly had a right to. The Board had not hitherto deprived them of their riparian rights, but now proposed to do so; and full compensation must be paid.

The UMPIRE: What I am thinking of is this, that no compensation in money has been paid for the stream, but powers have been given to impound the water; and the question is what is the effect.

Mr. SUTTON agreed; but the other side could not prevent the water running down the brook and its being piped away. They had no authority to do this. Their power was limited to laying a pipe and taking it down to the lower reservoir; but they could not take the water away from the brook at the spot. They still preserved their riparian rights. They had no authority to impound; and there was nothing in the Act to show that they might cut off the water from the brook. They might make the reservoir; and the result of this would be that while the reservoir was filling the brook would be dry.

Mr. ACWORTH disputed the fact that the water was bound to come down the brook.

Mr. SUTTON said this was a very difficult and important case; and he could well understand that the Chesterfield Corporation felt it to be very important, and that it perhaps would not be limited to the matter that was at present being discussed. More valuable rights than those in question in this case might depend upon the decision that might be arrived at. In 1894 the demand for water still continued to increase; and it became a question where the Company could get it from. Whether they thought that the area of the watershed where the reservoirs were situated was very valuable, or whether it was that they did not like the situation, he did not know. But instead of going for the purpose of making a reservoir at one place, they went to another brook, a little more to the south (the Hipper Brook); and brought in an Act to take in the waters of the brook and convey them to Chesterfield. The neighbourhood was up in arms. He believed the Chesterfield Corporation, among others, opposed it, with the result that the scheme was thrown out; but upon the condition that the Chesterfield Corporation would buy the undertaking and would themselves provide a sufficient supply for the purposes which the old Company had in view. This was carried out; and in 1895 the Chesterfield Water and Gas Board was formed to take over the old Company, and the area of supply was extended.

Mr. ACWORTH said there was in some sense an extension. In section 38 of the Act there was power to contract for the supply to the Rural District Council. There was not an extension of area; but an extension of the powers of supply.

Mr. SUTTON said that, under section 40, if the Rural District Council wished to do it, they had the right to do it; and if they did not do it, then it would become necessary for the Water Board to do so. It showed that outside the jurisdiction there were other consumers than the Water Board who might be willing. Apparently, in 1904, the Board took steps to increase the supply—the parishes of the Rural District Council not having exercised their option; and among other powers they took the portion of the land belonging to Mr. Lucas. This was what they never had power to do before—"may divert any water which they are now authorized to take, but nothing in the Act shall authorize them to take any water which they are not now authorized to take." It was a most extraordinary section. He presumed it meant that they might take the water of the Linacre Brook and impound it, because they were authorized by previous Acts of Parliament to impound it. He could not see where they were authorized to take the water from the little becks. What was there to prevent the owners of the land through which the brooks flowed making a reservoir to hold the water, provided they sent it on?

The UMPIRE: What about the riparian owner? He cannot dam it up.

Mr. SUTTON said he might utilize it for trade. He wanted to know how the other side contended that they were entitled to take the waters. They were, however, going to do it; and they must therefore pay for it.

Mr. ACWORTH: As I understand, your contention is that we may take the waters of the Linacre Brook, but that you have a right to any tributaries before they reach the brook on the land.

Mr. SUTTON: Yes; but subject to the riparian rights where the waters were flowing. The Board said they could utilize them; but the claimant could utilize them by means of the catchwaters of the watershed. There was nothing to prevent them giving all the water of the Linacre Brook and bringing the water of the watershed into their reservoir. The special adaptability theory did not depend upon the owners of the land being able to carry out the work. It was for the other side to say that they could not make use of the site. It was one of the difficulties about the case that the Board never paid a farthing for this watershed area. No one had ever been benefited; and their contention seemed to be that they would prevent the claimant making use of a valuable watershed by buying this piece of land, which could be made into a reservoir, and paying nothing for the watershed. Another point was that, assuming they could not be allowed to join with others to make the reservoir——

The UMPIRE: I decide at once that you can. If it is requisite, I shall put a clause in my award.

Mr. SUTTON said they had to look to the future. The witnesses he would call would say that they could make a catchwater at the bottom of their land which would be about the middle of the reservoir proposed to be made; and they could drain the area and give a supply of 200,000 gallons a day. There would be no one to say them nay.

The UMPIRE: Only this, that it might cost more money to make a catchwater.

Mr. SUTTON said it could be made. There would be plenty of people who would be entitled to have the water; and they could still do it at a price which would be profitable to them.

Mr. *E. W. Dixon*, a civil engineer, submitted that the following valuation, which he had made jointly with Mr. R. Armistead and Mr. E. Holmes, of lands taken under the Act of 1904, on the basis of the reservoir site: 17·368 acres of land purchased for reservoir site and "surround" at £100 per acre, £1736; add 10 per cent. for compulsory sale, £173; total, £1909. Add proximity value, calculated on a basis of 0·15d. saving in conveyance of water between the watershed and the consumer, equal to 73 million gallons per annum, or an annual value of £55, by thirty years' purchase, equal to £1350. This sum, divided over the 24 acres total area necessary for the reservoir site and surround, is equal to a value of £58 per acre. Claimant's land necessary for part reservoir site, 12 acres, multiplied by £58 per acre, £696; the total claim amounting to £2605. The joint valuation on the catchwater basis of the claim was as follows: 17·368 acres of land purchased for the site of the Middle Linacre reservoir, with "surround," taken at £50 per acre, £868; add 10 per cent. for compulsory sale (£86), £955. Value of water available from 25 acres of watershed between the sites of Nos. 1 and 2 catchwaters, taken at 8 inches of available rainfall per annum, at 2d. per 1000 gallons, equal to £37 10s. annual value, by 30 years' purchase, £1125; additional cost to owner due to increased length of catchwater, 400 yards at £1 10s. (£600), making £1725—total claim, £2680.

*Witness* was cross-examined respecting his statement that a reservoir could be made privately on the site and water sold at a rate of 6d. or 6½d. per 1000 gallons. He said his suggestion was that this was possible, and that a manufacturer, owing to the scarcity of water, might be found to take from it.

Mr. ACWORTH asked what right there would be to take the water from the riparian owners below.

*Witness* said he was entitled to such an amount of water as fell upon his own land. He admitted that the scheme suggested would involve obtaining wayleaves from the Duke of Devonshire. He thought for an expenditure of £9000 a water supply on the outskirts of Chesterfield could be made equivalent to a supply of 60,000 gallons a day. This, at 6½d. per 1000 gallons, would pay a hypothetical company or others. He based his calculations as to 6d. upon the Chesterfield Water Act of 1855, which fixed the price for a supply for other than domestic purposes at 8d. per 1000 gallons.

Mr. ACWORTH pointed out that this Act had been repealed, and that at the present time Chesterfield could supply water, if it liked, for such a purpose at 6d. per 1000 gallons; but witness maintained that Chesterfield now required all the available supply from the valley, and that, under these circumstances, they would not be likely to supply water at 6d. per 1000 gallons for commercial purposes.

Mr. *R. Armistead* and Mr. *R. Holmes* gave evidence and submitted valuations similar to that of Mr. Dixon.

Mr. ACWORTH, in opening the case for the Board, said his witnesses would state that the land in question was agricultural land, and had been valued by them on this basis for all practical purposes. The other side had been led away by the idea that they should value it as a water site. The result was that they had not paid as much attention as they otherwise would have done to its agricultural value. It came to the question as to what was the fair agricultural value of the property, treating it as such, and having regard to any injury that might be done to the rest of the agricultural property next to it which was held at present.

Mr. *E. M. Eaton* had known this particular locality for thirty years. He was one of the Consulting Engineers of the old Chesterfield Water and Gas Company, who were taken over in 1895 under an arbitration. He had been called in as Consulting Engineer in reference to this middle reservoir. He had come to the conclusion that the value of the property was an agricultural value. He took it purely on an agricultural basis, and was of opinion that there was no practical basis in this case other than an agricultural basis. The following was his valuation: 8 acres, 1 rood, 5 perches, at £2 per acre, taken at thirty years'

purchase, £495 10s.; 2 acres, 0 rood, 17 perches, at 15s. per acre, at thirty years' purchase, £47 7s. 6d.; 7 acres, 0 rood, 2 perches, woodland, at £15 per acre, £105 3s. 9d., £648 1s. 3d.; add £64 16s. 2d. for compulsory sale—total claim, £712 17s. 5d.

Mr. *E. Lovell Clare* submitted a total valuation of £715 on an agricultural basis; and Mr. *Smith Denton*, a surveyor, of Sheffield, gave evidence to the same effect.

Mr. *J. Middleton*, the Law Clerk to the Water Board, having given formal evidence as to the position of the lands of the Duke of Devonshire and other owners,

Counsel addressed the Court for the parties, and

The UMPIRE announced that the award would be reserved.

## GELTSDALE WATER SCHEME.

### Question of Compensation to the Earl of Carlisle.

At the Surveyors' Institution on the 20th inst., proceedings were concluded in the arbitration case of the Earl of Carlisle against the Corporation of Carlisle. It was a claim for compensation for depreciation of an estate at Geltsdale, near Carlisle, part of which the Corporation have taken for their water supply. The matter has already proved the subject of a previous arbitration and of proceedings in the High Court.* The Corporation in 1905, under the powers of their Water Act, acquired some four or five acres of land upon the Earl of Carlisle's estate, upon which were some springs, and also a stream. For this, they paid compensation and purchase price. The Earl then claimed compensation for depreciation of his adjoining estate, upon which it was stated that there were four reservoir sites, but that in consequence of the action of the Corporation they had destroyed the water-bearing value of the estate, and a large sum was claimed in consequence. The Umpire was Mr. John Farrer. The Arbitrator for Earl Carlisle was Mr. W. J. Heskett, and for the Corporation Mr. R. Fenwick. After the previous arbitration, Mr. Farrer awarded Earl Carlisle £17,261. The Corporation then took the case to the High Court, on the ground that the Umpire should state separately if he awarded anything for water; and, if so, how much. The Courts referred the matter back to the Umpire to state his award separately in respect of water and depreciation to the estate. The Umpire now had the assistance of a legal assessor in the person of Mr. Williams.

The Hon. J. D. Fitzgerald, K.C., Mr. R. D. Acland, K.C., and Mr. A. Du Cane appeared for the Earl of Carlisle; while Mr. Balfour Browne, K.C., Mr. E. Page, K.C., and Mr. J. G. Wood represented the Corporation.

Evidence was given by Professor Boyd Dawkins, F.R.S., to the effect that reservoirs could be constructed and water properly stored on the Earl of Carlisle's estate at Geltsdale. There were four sites available in the Geltsdale. In cross-examination by Mr. Balfour Browne, witness said he originally selected sites in Geltsdale for the Corporation reservoir; but this was placed elsewhere owing to the ruling of Parliament. Similar evidence was given by Mr. Henry Rofe, M.Inst.C.E. He considered the estate was a valuable water-bearing area. In cross-examination by Mr. Page, he admitted that Earl Carlisle had the same rights as regards underground water that he had before the Act of 1898. He could to-day construct a reservoir on his own land and use the underground waters.

Mr. J. M. Clark was the next witness. He considered the estate was of great value as a water-bearing property; but its value in this respect had been destroyed by the action of the Corporation, as no other authority would be allowed to come there for water now that Carlisle had secured a site in the immediate vicinity. He valued the estate before the Corporation came there at £63,600, and said it had been depreciated to the extent of £22,797. In cross-examination, he said provision was made in the Carlisle Water Act for the Earl of Carlisle to have as much water as he desired for his own use and for agricultural purposes. With regard to his rights in the underground waters, these had not been interfered with. Replying to Mr. Page (for the Corporation), who asked if anybody would give more for it than agricultural value because of the chance of Carlisle coming to it for water, witness said he was sure a purchaser would take that into consideration. He knew of no property that had such a splendid supply of water.

Evidence was then given by Mr. J. T. Wainwright, who said he had considered the great cost to the Earl of Carlisle of getting the water before it reached the stream and the small probability there was that Carlisle would ever require, or be able to utilize, the great quantity of water produced. The effect, however, of their Act had been to add enormously to the cost of the Earl of Carlisle obtaining water if he desired; and it practically kept out other probable customers. The estate, in so far as it was a water-bearing estate, had been for ever sterilized; so that whatever additional value appertained to it through the presence of the underground waters had been abstracted, leaving the estate poorer by £23,000, to which damage he said Earl Carlisle was entitled. He admitted, in answer to Mr. Balfour Browne, that the Earl of Carlisle might, by digging a trench behind the existing springs, tap the underground waters, and could utilize them, if there was any market for them. Mr. Richard Edgar Horsfall gave similar evidence. He estimated the depreciation at £22,000. Replying to Mr. Page, witness said if Carlisle had not obtained their Act, other corporations might have gone there and taken the four reservoir sites available.

Mr. Page, on behalf of the Corporation, said Lord Carlisle could not deprive other riparian owners of their water from the running streams. He had been compensated for his riparian rights, and could not claim any further damage. He called Mr. Mansergh, M.Inst.C.E., who gave evidence to the effect that the Geltsdale was not a suitable place for reservoir construction. The geological conditions were such as to make the construction of reservoirs there very expensive indeed. He thought the Corporation were well advised in going from the Earl of Carlisle's estate to Carrick Castle to erect their reservoirs. He could not conceive any other town coming to the Geltsdale for water. The suggestion that Newcastle might want it was ridiculous. In his opinion, no damage had been sustained to the Earl's estate. The underground water was still his; and he had been compensated for certain riparian rights for the Gelt mill, the sheep wash, and fishing rights. Mr. Charles Hawksley and Professor Kendall gave evidence as to the unsuitability of the Geltsdale for reservoir purposes.

Mr. Balfour Browne, for the Corporation, contended that this was really a claim for water which could not be sustained, and not for depreciation to the estate from any other point of view. The springs had been taken, and did not belong to the Earl of Carlisle. That had been decided in the Court of Appeal. He was not claiming for these, and if he were he was claiming wrongly. His witnesses were in a difficult position. They had before claimed for water at ¼d. per 1000 gallons. But this claim could not be sustained. They were putting it in a different way; but it was nevertheless a real claim for water for which they were not entitled to claim. They had charged for the whole estate at the same rate they had for four reservoir sites, which could not possibly be maintained. If the Corporation had constructed reservoirs on the four sites which had been mentioned, then he thought there would have been evidence that at any rate the sites were suitable, and they could then have claimed their value from them as reservoir sites. The fact, however, that they had gone elsewhere was an indication that these sites were not to be taken into consideration at all, because they were unsuitable. He relied on the evidence that no special adaptability or adaptability at all had been proved; and the Court was bound by the evidence before it, and not by any arguments which might be adduced by his friend. If that were so—and he said it was—then this claim put forward for £22,000 was a new attempt to substantiate the previous claim for loss of water. If so, and if the Umpire was going to award anything for water, then he must ask him to make his award in the shape of a special case, so that he might have it tested in the High Court. The Earl of Carlisle had already received special damages in this case as a riparian owner. But what was meant by this claim for a "water-bearing estate"? If it meant anything, it meant a claim for water underground, which had not yet become the property of the riparian owners. His rights in these had not been interfered with by anything the Corporation had done, and he was not entitled to any compensation for it. Even the claimant's witnesses had admitted this; and so the claim he thought could not be sustained. Counsel also pointed out that no claim with regard to special or any other adaptability could be sustained without it had been shown that there was some competitor in the field, which was not the case here.

The Hon. J. D. Fitzgerald contended that Mr. Balfour Browne had treated the claimant's witnesses unfairly, because, at the first hearing, they had, in estimating the depreciation of the estate, used the unfortunate statement that the water on the estate was valued at ¼d per 1000 gallons. The largest element of value was its capabilities as a water-producing estate; and the Corporation of Carlisle under their Act had taken powers, as a result of which the value of the estate was absolutely gone from the moment the Act was passed and the water virtually became the property of the Corporation. Now that Carlisle had obtained this Act, in the present feeling of the Legislature it was impossible for any other town to come into the valley to avail itself of the water on Lord Carlisle's estate. Their claim was founded purely on fact, and involved two questions. First, was this estate, by reason of its water-bearing and water-storing capabilities, of special value above agricultural or sporting land; and, secondly, had this value been destroyed or depreciated by the exercise by the Corporation of their statutory powers under the Act of 1898? He said both questions, according to the evidence, should be answered in the affirmative; and, under these circumstances, Lord Carlisle was entitled to compensation. He pointed out the exceptional character of the estate as a water-bearing estate. It was not necessary for him to prove that there were competitors in the field for its purchase. It was sufficient for him to state there was a customer; and that that customer was Carlisle. This was decided beyond dispute in the Aspatria case. In conclusion, he asked for suitable compensation for the injury to the estate.

The Umpire reserved his award.

* See "JOURNAL," Vol. XCIII., p. 749, Vol. XCIV., p. 716, Vol. XCVII., p. 831, and Vol. XCVIII., p. 536.

**Suicide by Gas.**—That deceased committed suicide by inhaling coal gas while of unsound mind, was the verdict of the Coroner's Jury who sat to inquire into the circumstances surrounding the death of Miss Elizabeth Jamieson, aged 61, who died at Halliford House Asylum last Tuesday week. On June 26, she was found sitting in a chair unconscious at her house. The room was full of gas; the tap of the stove being on full, and the windows and door and the grate-register were all closed. She appeared to have recovered from this; but symptoms of insanity set in. The doctor stated that death was due to peritonitis and congestion of the lungs, following poisoning by the inhalation of coal gas.

**Cookery Demonstrations at the Cape.**—We learn from copies of Cape papers just to hand that, as the result of the activity of Mr. William Arnott, the Manager of the South African Lighting Association, a course of free lectures and demonstrations in cooking by gas was opened in the Loubser Hall, Port Elizabeth, on the 26th ult., when an appropriate address was delivered by Mr. J. C. Kemsley, J.P. He alluded to the intelligent part played by cookery in the school *curriculum* of the present day, and pointed out that the demonstrations were not being given exclusively to display the wares of the Association, but for the special purpose of showing the mothers and girls of Port Elizabeth the best ways of cooking. The first demonstration was then given by Miss Rose Dennis, the Teacher of Cookery in the Cape Town and suburban schools. It occupied close upon two hours, and was followed with the utmost interest by a crowded audience. The Company had freely distributed note-books among the ladies, and full use was made of them. After the lecture, Miss Dennis answered any question arising out of the demonstration; and representatives of the Company were in attendance to furnish particulars in regard to the gas-stoves the Company supply. The second and third lectures were delivered on the 27th and 28th of June; and another series on the 1st, 2nd, and 3rd inst.

## NOTES FROM SCOTLAND.

**From Our Own Correspondent.**

*Saturday.*

We are under the refreshing influence of the meeting of the North British Association of Gas Managers, held two days ago in Glasgow. It was an important and a successful meeting, giving no indication, in any way whatever, that the Association are affected by the prosperity which has attended the Junior Gas Association in their short existence. A good deal of the time on Thursday was occupied by the business—at times necessary—of putting their house in order. It was even proposed to change the name of the Association, as a sort of sop to patriotic feeling. The proposal, however, was not adopted; the feeling of quite two-thirds of the members present being that no change should be made. Probably the proposal—which, it will be noted, was opposed by the Committee, without giving any reasons—was made in anticipation of the action of the members upon the question of affiliation with the Institution of Gas Engineers. I dare say, if the members had agreed to change the name of the Association, affiliation would have been agreed to without opposition; for it cannot be overlooked that, when this question came to be discussed, the objections to it were not upon the merits, but upon the procedure. Affiliation was agreed to by an overwhelming majority; and then afterwards, through the grace of those who had spoken against it, the resolution was made unanimous. The decision to affiliate was helped very materially by the frank statement made by Mr. W. Doig Gibb, of Newcastle, the President of the Institution. The pity is that Mr. Doig Gibb, being a Scotsman, was not, in consideration of the interesting occasion, made an honorary member of the North British Association; but probably this was overlooked. It may yet be remedied. If there is one point in connection with affiliation on which the North British Association might have been sensitive, but which was not stated by the opponents of affiliation, it was that of precedence. The subject, I suppose, has not yet been considered by the Council of the Institution; but it is a matter which will most probably arise. The North British Association is the oldest of all the affiliated Associations, and, as such, may well claim that their representative should rank next to the President of the Institution on all ceremonial occasions. Such a claim will possibly be disputed by the representatives of larger Associations, on the plea that influence should rank, and not seniority. It would have been better if this question had been settled before affiliation was agreed to. It may be said that there is not much value in position. But there are occasions now and then, such as a reception or a banquet with distinguished people present, when it is of importance; and there are often wrangles, and very bitter ones, over who is to go first in the business. The Association agreed to form a Commercial Section; the decision being officially unanimous, but against the protest of Mr. J. Napier Myers, of Saltcoats. The information regarding the section was conveyed to the members by circular, with the contents of which I am not acquainted. It is to be a separate body, as independent of the North British Association in its working as that Association will be of the Institution—being, in fact, a sort of vassal of the Association. This may account for the fact that all that was done was to resolve that a section be formed; and no arrangements were made for the formation or working of it. The technical matter before the meeting was of quite an interesting nature, bringing into prominence the awakened interest which there now is in the use of retort-house governors, and the methods of extracting naphthalene, which is a new subject of consideration for Scotch gas managers. It is with feelings of regret that the resignation by Mr. R. S. Carlow of the offices of Secretary and Treasurer has been received. Mr. Carlow has devoted himself to the interests of the Association with unflagging zeal, coming up, year after year, with everything in his department in the most perfect order. He has enjoyed the confidence of every President under whom he has served, and has, by each one of them, been praised for his excellent services to the Association, and the assistance he rendered to them. When he quits office, he may be assured that he will carry with him the kindly remembrances and good wishes of all with whom he has come in contact in his official capacity.

The Edinburgh and Leith Gas Commissioners held their usual monthly meeting on Monday last. In the minutes of the special meeting on the previous Monday, it was mentioned that the Engineer had submitted to the Works Committee, on the 15th inst., a statement of the coal proposed to be purchased for the period ending May 15, 1908, and that the Committee recommended acceptance of tenders for 15,000 tons of Newbattle bottoms, 25,000 tons of Edinburgh Hartley, and 10,000 tons of Riggonhead. The Committee recommended that the Engineer should be instructed to negotiate for a modification in price of the other offers which were included in his recommendation, amounting to 44,000 tons, and that he should also receive power to purchase a further quantity of from 6000 to 10,000 tons as required. This is the 94,000 tons purchased on the same date, as stated in these notes last week. The same minute also contained the statement that the Clerk reported to the Committee that, on the instructions of the Sub-Committee, and as advised by Counsel, he had lodged a tender of £4000 in connection with the second action by Messrs. James Muir and Son, Limited; that the offer had been refused; and that thereupon the Committee recommended that the Commissioners should not increase their tender, but should take the award of the Court in the case.

At the meeting last Monday, the Finance and Law Committee reported that they had considered the print abstract of the Commissioners' accounts for the year to Whitsunday last, with the relative notes by the Treasurer upon them, and that, having found the abstract correct, they had resolved to recommend the Commissioners to allow and certify the accounts; to set apart for the annuities sinking fund and the mortgages sinking fund the statutory minimum contributions—viz., £6944 and £11,918; and for the reserve fund £3111, being £2000 beyond the minimum statutory contribution; and to carry forward the balance of £912 to the credit of this year's accounts. The Commissioners approved the accounts.

The Commissioners, without comment, adopted the interesting report by Mr. W. R. Herring, summarized in the "JOURNAL" last Tuesday, on the liability of the Commissioners under the Workmen's Compensation Act. They could scarcely have done otherwise; for a more convincing document could not be conceived. The demonstration that the Commissioners have been able to clear off all their liabilities for accident during the past ten years, by payments which do not amount to more, on the average, than 2s. 9d. per £100 of wages paid, is a significant fact, worthy to be taken into account by owners of gas-works everywhere; and it may go some way towards allaying the undoubted scare which exists at present over the Act.

The Corporation of Elgin are finding trouble over the obtaining of a site for the erection of a new gasholder. There is very great

## GAS COMPANIES' STOCK AND SHARE LIST.

**Referred to on p. 302.**

| Issue. | Share. | When ex. Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. |
| 500,000 | 10 | Apl. 11 | 10½ | Alliance & Dublin 10 p.c. | 20—21 | .. | 5 0 0 |
| 268,324 | 10 | ,, | 7⅞ | Do. 7 p.c. | 13¾—14¼ | .. | 5 3 5 |
| 200,000 | 5 | May 15 | 7 | Bombay, Ltd. | 6½—7 | .. | 5 0 0 |
| 40,000 | 5 | ,, | 7 | Do. New, £4 paid | 4⅝—5⅞ | .. | 5 6 8 |
| 50,000 | 10 | Feb. 28 | 14 | Bourne- mouth Gas and Water } 10 p.c. B 7 p.c. Pref. 6 p.c. | 27½—28½ | .. | 4 18 3 |
| 51,810 | 10 | ,, | 7 | | 16½—17 | .. | 4 2 4 |
| 53,200 | 10 | ,, | 6 | | 15—16 | .. | 3 15 0 |
| 380,000 | Stk. | ,, | 12½ | Brentford Consolidated | 250—255 | .. | 4 18 1 |
| 300,000 | ,, | ,, | 9¾ | Do. New | 188—193 | .. | 4 18 5 |
| 50,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 117—122 | .. | 4 2 0 |
| 206,250 | ,, | June 13⅛ | 4 | Do. 4 p.c. Deb. | 102—103 | .. | 3 17 8 |
| 220,000 | Stk. | Mch. 14 | 11½ | Brighton & Hove Orig. | 220—225 | .. | 5 0 0 |
| 246,320 | ,, | ,, | 8½ | Do. A. Ord. Stk. | 160—165 | .. | 5 0 0 |
| 460,000 | 20 | Apl. 11 | 10 | British | 41—43 | .. | 4 13 0 |
| 104,000 | Stk. | Feb. 28 | 6 | Bromley, Ord. 5 p.c. | 119—122 | .. | 4 18 4 |
| 165,700 | ,, | ,, | 4½ | Do. do. 3½ p.c. | 90—93 | .. | 4 16 9 |
| 500,000 | 10 | May 15 | 7 | Buenos Ayres (New) Ltd. | 11—11⅛ | .. | 6 1 9 |
| 250,000 | Stk. | June 27 | 4 | Do. 4 p.c. Deb. | 93—95 | .. | 4 4 3 |
| 150,000 | 20 | July 12 | 8½ | Cagliari, Ltd. | 25—27* | .. | 5 17 10 |
| 100,000 | 10 | June 13 | 10 | Cape Town & Dis., Ltd. | 11—13 | .. | 7 13 10 |
| 100,000 | 10 | Apl. 26 | 4½ | Do. 4½ p.c Pref. | 8—9 | —½ | 5 0 0 |
| 50,000 | 50 | May 2 | 6 | Do. 6 p.c. 1st Mort. | 50—52 | .. | 5 15 5 |
| 50,000 | Stk. | June 27 | 4½ | Do. 4½ p.c. Deb. Stk. | 94—96 | .. | 4 13 9 |
| 157,150 | Stk. | Feb. 28 | 5 | Chester 5 p.c. Ord. | 109—111 | .. | 4 10 1 |
| 1,443,280 | Stk. | ,, | 5⅛ | Commercial 4 p.c Stk. | 105—108 | .. | 4 16 4 |
| 560,000 | ,, | ,, | 5 | Do. 3½ p.c. do. | 102—105 | .. | 4 15 3 |
| 475,000 | ,, | June 13 | 3 | Do. 3 p.c. Deb. Stk. | 81—83 | .. | 3 12 3 |
| 800,000 | Stk. | ,, | 6¾ | Continental Union, Ltd. | 112—117 | .. | 5 11 1 |
| 270,000 | ,, | ,, | 7 | Do. 7 p.c. Pref. | 136—141 | .. | 4 19 3 |
| 460,170 | Stk. | — | 5¾ | Derby Con. Stk. | 123—125 | .. | 4 8 0 |
| 55,000 | ,, | Jan. | 4 | Do. Deb. Stk. | 102—104 | .. | 3 16 11 |
| 486,090 | 10 | Jan. 31 | 12† | European, Ltd. | 23¾—24¾ | .. | 4 18 0 |
| 354,080 | 10 | ,, | 12† | Do. £7 10s. paid | 18—19 | .. | 4 14 9 |
| 15,182,590 | Stk. | Feb. 14 | ·⅛ | Gas- light and Coke } 4 p.c. Ord. | 95—97 | .. | 4 10 10 |
| 2,600,000 | ,, | ,, | 3¾ | | 88—90 | .. | 3 17 9 |
| 3,799,735 | ,, | ,, | 4 | 3½ p.c. max. | 104—107 | .. | 3 14 9 |
| 4,193,975 | ,, | June 13 | 3 | 4 p.c. Con. Pref. | 82—84 | .. | 3 11 5 |
| 258,740 | Stk. | Mch. 14 | 5 | 3 p.c. Con. Deb. | 95—100 | .. | 5 0 0 |
| 82,500 | ,, | ,, | 6¾ | Hastings & St. L. 3½ p.c. | 116—119 | .. | 5 9 3 |
| 70,000 | 10 | Apl. 26 | 11 | Do. do. 5 p.c. | 15—20 | .. | 5 10 0 |
| 4,940,000 | Stk. | May 15 | 8 | Hongkong & China, Ltd. | 173—176 | .. | 4 10 11 |
| 473,600 | Stk. | Feb. 14 | 3½ | Imperial Continental | 93—95 | .. | 3 13 8 |
| 184,602 | Stk. | Mch. 14 | 6 | Do. 3½ p.c. Deb. Red. | 110—120 | .. | 5 0 0 |
| 306,083 | ,, | June 27 | 4 | Lea Bridge Ord. 5 p.c. | 108—110 | .. | 3 12 9 |
| 561,000 | Stk. | Feb. 28 | 10 | Liverpool United A | 221—223 | .. | 4 9 8 |
| 718,100 | ,, | ,, | 7 | Do. B | 164—165 | .. | 4 4 10 |
| 144,140 | Stk. | Feb. 14 | 7⅝ | Maidstone 5 p.c. | 142—147 | .. | 5 3 8 |
| 75,000 | 5 | June 27 | 5 | Malta & Medn., Ltd. | 4—4½ | .. | 5 11 1 |
| 560,000 | 100 | Apl. 2 | 5 | Met. of 5 p.c. Deb. | 100—102 | .. | 4 18 0 |
| 250,000 | 100 | ,, | 4½ | Melbourne 4½ p.c. Deb. | 100—102 | .. | 4 8 3 |
| 541,920 | 20 | May 30 | 3½ | Monte Video, Ltd. | 10½—11½ | .. | 6 1 9 |
| 1,775,892 | Stk. | Feb. 28 | 4½ | Newc'tle & G'tesh'd Con. | 108—109 | .. | 4 4 10 |
| 406,025 | Stk. | June 27 | 3½ | Do. 3½ p.c. Deb. | 93½—94½ | —¼ | 3 13 8 |
| 15,000 | 10 | Feb. 28 | 10 | North Middlesex 10 p.c. | 19½—20½ | .. | 4 17 7 |
| 55,940 | 10 | ,, | 7 | Do. 7 p.c. | 13—14 | .. | 5 0 0 |
| 300,000 | Stk. | Apl. 26 | 8 | Oriental, Ltd. | 140—145 | .. | 5 10 4 |
| 60,000 | 5 | Mch. 27 | 7 | Ottoman, Ltd. | 6—6½ | .. | 5 7 8 |
| 398,490 | 5 | May 15 | 7 | Primitiva Ord. | 6½—7½ | .. | 4 16 7 |
| 796,980 | 5 | Jan. 31 | 5 | Do. 5 p.c. Pref. | 5—5½ | .. | 4 15 3 |
| 488,900 | 100 | June 1 | 4 | Do. 4 p.c. Deb. | 94—96 | .. | 4 3 4 |
| 1,000,000 | 10 | Apl. 26 | 8 | River Plate Ord. | 12¾—13¼ | .. | 6 0 9 |
| 312,650 | Stk. | June 27 | 4 | Do. 4 p.c. Deb. | 93—95 | .. | 4 4 3 |
| 250,000 | 10 | Mch. 27 | 8 | San Paulo, Ltd. | 12⅞—13¼ | .. | 6 0 9 |
| 125,000 | 50 | July 1 | 5 | Do. 5 p.c. Deb. | 48—50 | .. | 5 0 0 |
| 135,000 | Stk. | Mch. 14 | 10 | Sheffield A | 245—247 | .. | 4 1 0 |
| 209,984 | ,, | ,, | 10 | Do. B | 245—247 | .. | 4 1 0 |
| 523,500 | ,, | ,, | 10 | Do. C | 245—247 | .. | 4 1 0 |
| 70,000 | 10 | June 13 | 10 | South African | 15—16 | .. | 6 5 0 |
| 6,350,000 | Stk. | Feb. 14 | 5⅜ | South Met., 4 p.c. Ord. | 120—122 | .. | 4 10 2 |
| 1,895,445 | ,, | July 12 | 5 | Do. 3 p.c. Deb. | 82—84* | .. | 3 11 5 |
| 201,720 | Stk. | Mch. 14 | 8 | South Shields Con. Stk. | 159—161 | +2 | 4 19 5 |
| 605,000 | Stk. | Feb. 28 | 5⅜ | S'th Suburb'n Ord. 5 p.c. | 117—121 | .. | 4 10 11 |
| 60,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 120—123 | .. | 4 1 4 |
| 117,058 | ,, | July 12 | 5 | Do. 5 p.c. Deb. Stk. | 120—125* | —3 | 4 0 0 |
| 502,310 | Stk. | May 15 | 5 | Southampton Ord. | 105—110 | .. | 4 10 11 |
| 120,000 | Stk. | Feb. 28 | 6½ | Tottenham A 5 p.c. and B 3½ p.c. | 100—103 | .. | 4 17 1 |
| 398,940 | ,, | ,, | 5 | | 123—126 | .. | 5 3 2 |
| 137,500 | ,, | June 27 | 4 | Edmonton 4 p.c. Deb. | 99—101 | .. | 3 19 3 |
| 182,380 | 10 | June 13 | 8 | Tuscan, Ltd. | 10¼—10½ | .. | 7 8 10 |
| 149,900 | 10 | July 1 | 5 | Do. 5 p.c. Deb. Red. | 100—102 | .. | 4 18 0 |
| 193,742 | Stk. | Feb. 28 | 5 | Tynemouth 5 p.c. max. | 107—109 | +1 | 4 11 9 |
| 30,000 | Stk. | Feb. 14 | 8 | Wands- worth and Putney A 5 p.c. B 3½ p.c. C 3½ p.c. 3 p.c. Deb. Stk. | — | .. | — |
| 255,636 | ,, | ,, | 6¾ | | 131—136 | .. | 4 15 7 |
| 75,000 | ,, | ,, | 5⅝ | | — | .. | — |
| 79,416 | ,, | June 27 | 3¼ | | 77—80 | .. | 3 15 0 |
| 845,872 | ,, | Feb. 28 | 5⅝ | West Ham 5 p.c. Ord. | 102—105 | .. | 4 17 7 |
| 185,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 120—123 | .. | 4 1 4 |
| 228,300 | ,, | June 27 | 4 | Do. 4 p.c. Deb. Stk. | 110—103 | .. | 3 17 8 |

Prices marked * are "Ex div." † Next dividend will be at this rate.

need for a new holder; there being at present storage capacity for only 80,000 cubic feet of gas, while the maximum daily make is now 180,000 cubic feet. The Council had three sites before them last month; and they decided upon one in a part of the town which is thickly peopled. A number of the dwellers there, within the 300 yards radius, held a meeting on the 4th inst., and instructed a Law Agent to lodge a protest with the Town Council against the proposal to erect the holder. The protest was lodged with the Town Clerk, who submitted it to the Town Council at a special meeting lately held. There was a long discussion upon it, in the course of which Bailie Gordon, the Convener of the Gas Committee, urged them to take proceedings before the Sheriff without delay, so that they might get at the work soon. The Council, by eleven votes to five, resolved to lay the matter before the Sheriff, and let him decide for them.

One or two statements of some interest were made by the Chairman at the recent meeting of the Cupar Gas Company, Limited. Although the consumption of gas had increased, the income was somewhat less, which was on account of the resolution to allow 2½d. per 1000 cubic feet discount to consumers who paid £15 and over for gas. Then there was the cost of the show-room they opened some time ago, and which was giving good results. The Manager informed him that he had fixed up no less than 37 gas-cookers. There was also a gratifying increase in prepayment meters. They had actually received £421 through these meters—or 161,040 pennies.

The annual meeting of the Berwick and Tweedmouth Gas Company was held on Wednesday, the 17th inst.—Mr. George S. Riddle in the chair. The Directors reported that the business of the Company was going steadily on. An exhibition was held in April. Owing to the great and unprecedented advance in the price of coal, as also in the price of other materials used in gas manufacture, they had been compelled to advance the price of gas from 3s. 7d. to 3s. 11d. per 1000 cubic feet. The net profit realized was £1157. The Directors recommended a dividend of 10 per cent., free of income-tax. The total income was £6583; and the expenditure amounted to £5426. At the present time the number of consumers and the quantity of gas sold were higher than they had ever been in the history of the Company. The Chairman proposed a vote of thanks to the Secretary, the Manager, and the other officials. The report was adopted, and the vote agreed to.

The annual business meeting of the Bo'ness Gaslight Company was held on Monday—ex-Provost Ballantine presiding. The report of the Directors showed that the quantity of gas manufactured was 24,905,600 cubic feet—an increase upon the previous year of 481,000 cubic feet. The usual dividend of 5 per cent. was declared, and a substantial sum carried forward. It was reported that the contracts for coal which had been entered into were at the rate of 13s. 5d. per ton, as compared with 8s. 9d., which would represent to the Company a difference of £550 for the year.

A Parliamentary Commission is at present sitting in Edinburgh for the consideration of a group of applications for Provisional Orders under the Private Bill Procedure (Scotland) Act, 1899. On Tuesday they had before them an application by the Edinburgh and District Water Trust, who wish additional powers: (1) To construct filters and other subsidiary works; (2) to define the limit of height to which the Trustees may be required to supply water; (3) to continue the line of railway laid down from Broughton Station to Talla, during the construction of the works; (4) to grant retiring allowances to officials; and (5) to alter the provisions with reference to the sinking fund. There was no opposition to any of the proposals, with the exception of that relating to the railway, as to which, Sir Basil Montgomery, of Stanhope, wished it removed. The purpose for which the railway was constructed, he maintained, was served when the Talla works were completed, and its continuance was a menace to the amenities of his property. For the Trustees, it was contended that the railway cost £60,000; and as the Trustees had power to take in water from other watersheds than the Talla, and might require to use that power, the railway would then be needed. The Commission approved the preamble of the Order, with conditions to protect the interests of Sir Basil Montgomery. His property is approached by a level crossing. It was part of his proposal that a bridge should be erected; but the cost of this, it was pointed out, in reply, would be not less than £2360. The Commission have allowed the level-crossing to remain.

The St. Andrews Town Council held a special meeting on Monday to consider as to the adoption of a scheme for the augmentation of the town's water supply. The meeting was held under compulsion from the Local Government Board, from whom a communication had been received, to the effect that if a plebiscite of the ratepayers were to be taken, they wished the Town Council to give an undertaking that one of the schemes before the Council would be proceeded with immediately thereafter. The Council had, however, replied to this communication that it would not be convenient to take the plebiscite till the end of September. There are five schemes before the Council. A letter was read from the Local Government Board, agreeing not to take action against the Council till after the end of September. Then the Council discussed the situation; the feeling being one of resentment at the threatened action of the Local Government Board, which, it was conceived, proceeded upon the assumption that the Council were defaulters. In the end, the Council selected three of the schemes to be laid before the ratepayers; the favourite one being Lumbo Den, the cost of which is estimated at £13,321.

**Colwyn Bay Water Supply.**—In the House of Commons on Monday last week, Mr. Weir asked the President of the Local Government Board whether, seeing that the Colwyn Bay Urban District Council now realize that the water supply is insufficient, he would ascertain if any steps were being taken to augment the supply, especially in view of the increased demand for water during the holiday season. Mr. Burns, in reply, said the district was supplied with water by the Conway and Colwyn Bay Joint Water Supply Board. The District Council, who were one of the constituent authorities of the Board, had for some time been pressing them to lay an additional main from the intake in Lake Cowlyd, so as to supply more water into the constituent districts; and about a week ago the Board resolved to seek powers next session to take more water from the lake.


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## CURRENT SALES OF GAS PRODUCTS.

**Week ending July 27.**

The London market for tar products remains in a steady position. There is, of course, the customary restriction of business at the holiday season. The shipment of pitch will restart in September; and more activity in this article may be then expected. Creosote oil is scarce; and 3d. to 3¼d. would have to be paid for a good make. A large shipment of this oil has lately taken place, and the quantity left in makers' stores is low; the local demand being also good. Benzol is daily finding new customers among motorists; and it is quite possible that the recently published report of the Committee of the Motor Union, recommending the use of benzol for motor purposes, will call for inquiry for the article. There is no alteration in the value of sulphate of ammonia, which may be put at £12, on Beckton terms.

LIVERPOOL, *July 27.*

**Sulphate of Ammonia.**

The market has been somewhat irregular, for while in some cases prices below the level of current quotations have been accepted, in urgent cases full prices have been paid. On the whole, there has not been much change in actual values, though at the close the tone is quiet, the month's requirements being covered, with quotations at £11 13s. 9d. per ton f.o.b. Hull, £11 16s. 3d. to £11 17s. 6d. per ton f.o.b. Liverpool, and £12 per ton f.o.b. Leith. There has been further speculative selling in the forward position at about the level of spot prices; but makers for the most part are firm at a premium of 2s. 6d. to 5s. per ton, according to position.

**Nitrate of Soda.**

This market is quiet but steady, with spot prices at 11s. to 11s. 3d. per cwt., according to quality.

LONDON, *July 27.*

**Tar Products.**

Things remain unchanged; and there does not appear to be any chance of increased business at present. Pitch is quiet. There is no business doing for prompt delivery; while for forward, dealers are unable to pay manufacturers' prices, owing to there being very little inquiry from the Continent. Creosote is still fairly firm, and makers are not anxious to sell for any length of time forward. There is no change in carbolic acid. Continental consumers will not make any increase on their recent offers. The prices of crystals are unaltered. Benzol, 90 per cent., remains unchanged, both for prompt and forward delivery. No business is reported in 50 to 90 per cent. benzol and toluol. Prices of solvent naphtha remain about the same in the North; but in London, makers' ideas are rather firmer for forward delivery.

The average values during the week were: Tar, 15s. 6d. to 20s. Pitch, London, 26s. nominal; east coast, 25s. to 25s. 6d.; west coast, 23s. 9d. to 24s. 6d. Benzol, 90 per cent., 7½d. to 8¼d.; 50-90 per cent., 8¼d. to 9¼d. Toluol, 10¼d. to 11½d. Crude naphtha, 4d. to 4¼d.; solvent naphtha, 1s. to 1s. 2¼d.; heavy naphtha, 1s. 1½d. to 1s. 3½d. Creosote, London, 2¾d. to 3d.; North, 2½d. to 2⅝d. Heavy oils, 3d. to 3¼d. Carbolic acid, 60 per cent., 1s. 7½d. to 1s. 7⅞d. Naphthalene, £6 to £12. Anthracene, "A" quality, 1¼d. to 1⅜d.

**Sulphate of Ammonia.**

This article is unchanged, and practically no business is reported. The principal London Gas Companies still ask £12 2s. 6d. to £12 5s. for forward; and the price for prompt may be taken at £12 1s. 3d. Ordinary London makes remain unchanged at £11 13s. 9d. to £11 15s. The price at Leith is £12 to £12 2s. 6d.; Liverpool, £11 16s. 3d. to £11 17s. 6d.; and Hull, £11 15s.

**Travelling Expenses of Local Authorities.**—Last Thursday, the President of the Local Government Board replied to a question on the above subject put to him by Mr. Rogers, the Member for Devizes. It was whether instructions were given by the Board to their Auditors to allow or to surcharge payment by a county council or any other local authority of the reasonable travelling expenses of the members when engaged in the business of such council or authority. Mr. Burns said no instructions had been given by the Board on the subject. He was, however, advised that, looking to the decision of the High Court in the case of *Rex v. Dolby*, a local authority were in general not empowered to pay the travelling expenses of members of their body when engaged on the ordinary business of the authority within the district. This view would, he said, apply to county councils as well as to other local authorities.

**Carlisle Gas and Water Supply.**—In his report to the Finance Committee for the year ending March 31, Mr. John Graham, the City Treasurer of Carlisle, says the total income on gas-works revenue account was £44,836, against £45,795 the previous year, a decrease of £959. This is mainly to be accounted for in the decreased amount received from the sale of tar, sulphate, and coke. The sale of gas shows an increase of £49. The expenditure amounted to £32,229, or a decrease of £1188. The largest item in this decrease is the cost of coal, which, on the year's working, shows a diminution of £684. The gross profit for the year amounts to £12,606; and after paying £593 for income-tax, £2731 instalment of loans, £1123 interest on loans, £120 interest on deposits, £170 bank interest, and the usual £1000 in respect of the contribution towards the cost of the water-gas plant, the net profit is £6869, which is slightly less than last year. The water-works account shows a very satisfactory state of affairs. The expenditure on revenue has diminished about £210, while the income has considerably increased. In this year's account the fixed charges have been taken to March 31 instead of June 30 as heretofore. Had a full year's income from all sources been shown, it would have amounted to £14,615, or nearly £1800 in excess of the previous year. The gross profits amount to £8338; and after payment of income-tax, instalment and interest on loans, and the debit balance on the baths account for the previous year, a net available surplus of £6693 is arrived at.

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## COAL TRADE REPORTS.

**Lancashire Coal Trade.**

There is little change to record in the coal industry of Lancashire. The warmer weather has brought about a lull in house qualities; but no reduction in prices. Owing to the Belfast strike, less coal has been exported to Ireland and more thrown upon the home market, but not in sufficient quantities to weaken existing rates. Furnace coal and coke continue to sell well. Gas coal and cannel are in very small demand. A new discovery of coal is reported from the neighbourhood of the Cheviot Hills. Less trouble is noticeable in the railway coal-waggon department. The general quotations are unaltered.

**Northern Coal Trade.**

There has been some further enlargement in the demand for steam coals. The market seems now to be brisk, with heavier exports and some tendency to higher prices for fuel generally. For best Northumbrian steams, the quotation has risen to 15s. 3d. to 15s. 6d. per ton f.o.b., second-class steams are 14s. 3d. to 14s. 6d., and steam smalls seem rather less scarce at 10s. to 10s. 3d. Work at the collieries seems to be brisk; and the heavy production is readily taken up by the demand. In the gas coal trade, there is a slow growth in the home consumption; and the exports are now very heavy. As to prices, Durham gas coal varies from about 13s. 6d. to 14s. 9d. per ton f.o.b. There are more contracts in course of negotiation, especially for export; and in one case about 40,000 tons have been sold for delivery to a French port, at a price that is believed to leave about 13s. 4½d. per ton f.o.b. A contract for Denmark is also spoken of as settled at near the same price. Other inquiries for gas coal, including additional quantities for the Metropolis, are believed to be in treaty. Coke is very steady, and gas coke for export is rather scarce. The limited production, coupled with dearer coal, has stiffened the price of gas coke, which is quoted at from about 17s. to 17s. 6d. per ton f.o.b.

**Scotch Coal Trade.**

Trade remains brisk, especially the foreign part of it. The miners have not yet fully resumed work, with the consequence that outputs are being promptly taken up, and, in fact, are not equal to the demand. The prices quoted are: Ell, 12s. 6d. to 14s. per ton f.o.b. Glasgow, splint 13s. to 13s. 6d., and steam 12s. 3d. to 12s. 6d. The shipments for the week amounted to 182,935 tons—a decrease upon the previous week of 130,382 tons, but an increase on the corresponding week of 1758 tons. For the year to date, the total shipments have been 7,881,421 tons—an increase upon the corresponding period of 475,424 tons.

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It is reported that the North Cheshire Water Company, who serve the Altrincham district, have decided to reduce their charge for garden hose-pipes to half the usual amount, in consequence of the exceptionally wet season.

The 400 additional £10 "B" shares in the Eastbourne Gas Company for which tenders were recently invited realized £10,503 19s. 6d.; being at the rate of more than £26 5s. per share. The issue was subscribed for nearly twice over.

Messrs. S. Wolf and Co., of No. 138, Southwark Street, S.E., have issued a new catalogue of their portable electric drilling and grinding machines. On p. 17 (fig. 4) is shown a hand grinding and polishing machine for operating on work *in situ*.

The Public Control Committee of the London County Council report that last month 19,505 gas-meters were sent in to the Inspectors for testing. Of these, 17,320 were stamped and 2185 were rejected. The fees received amounted to £553 15s. 6d.

Tenders for the issue of 600 ordinary shares of £10 each of and in the East Surrey Water Company were opened on Friday. They amounted to £9946, at prices ranging from £16 10s. to £16 15s. per share. The average price obtained was £16 11s. 6d. per share.

The Directors of the South Staffordshire Water-Works Company have decided (subject to the examination of the accounts by the Auditors) to recommend the declaration of a dividend for the half year to June 30, on the ordinary stock, at the rate of 7 per cent. per annum less income-tax. This will leave a balance of £7593 to be carried forward.

The Ashford Urban District Council, at their last monthly meeting, voluntarily decided to increase by £70 per annum the salary of their Gas Engineer and Manager (Mr. Herbert R. Turner), in order to show their appreciation of his first year's service, and for the extra work devolving upon him in carrying out the extensions of a bench of regenerative settings and the carburetted water-gas plant.

Last Friday evening, there was a burst in the main which carries the water from the Elan Valley to Birmingham, at a point known as the Old Quarry, situated on Monument Hill, Hagley, near Stourbridge. The water rushed down the hillside, and flooded several cottages. It eventually found its way into the Birmingham Road, down which it poured in torrents, making traffic impossible, and cutting up the road badly. The water continued to flow for nearly 40 minutes before it could be cut off.

It is reported that a remarkable case of water finding has been achieved by Mr. H. Chesterman, of Bath and Hereford, at Brickiln Farm, Burghill, Hereford. Mr. Chesterman having been called in to locate water for general farm use, he stated that a good supply would be found at a depth of 65 feet. The spring was tapped at 68 feet, and rose to within 9 feet of the surface. The test pumping showed a yield of not less than 15,000 gallons per day from a 6-inch artesian tube well, which was sunk on the condition of "no water no pay."

The employees in the stove and meter departments of the Portsea Island Gas Company recently had their annual outing, followed by a smoking concert. Last Wednesday, the officials and workmen of the Ventnor Gas and Water Company, accompanied by the Chairman (Mr. W. H. Littlefield) and the Engineer and Secretary (Mr. J. S. Ineson), had an excursion to Freshwater, where they dined at Starke's Hotel. After dinner, Mr. Littlefield and Mr. Ineson were each presented with a silver-mounted pipe in a case. The return journey was by way of Carisbrooke, where tea was partaken of.


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